



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

MBA PROFESSIONAL REPORT

**USMC Aviation Maintenance and Repair Cost
for the H-1 Upgrade**

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 March 2012**

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REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE March 2012	3. REPORT TYPE AND DATES COVERED MBA Professional Report	
4. TITLE AND SUBTITLE USMC Aviation Maintenance and Repair Cost for the H-1 Upgrade			5. FUNDING NUMBERS	
6. AUTHOR (S) Shedrick Dashun Yearby				
7. PERFORMING ORGANIZATION NAME (S) AND ADDRESS (ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING /MONITORING AGENCY NAME (S) AND ADDRESS (ES) N/A			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. IRB Protocol number N/A.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			12b. DISTRIBUTION CODE A	
13. ABSTRACT (maximum 200 words) This research focuses on the Marine Corps Aviation Maintenance and Repair Cost for the H-1 Upgrade platform. Onsite visits with the Program Manager Air 276 (PMA-276), the Naval Supply Weapons Systems Support (NAVSUP WSS), the Defense Logistics Agency (DLA), and Marine Aviation Logistics Squadron 39 (MALS-39) are conducted to obtain information regarding readiness costs and efficiencies that have impacted the total cost for a transitioning aircraft in Marine aviation. PMA-276, NAVSUP WSS, DLA, and MALS-39 make up the H-1 Cross-Functional Team (CFT). The H-1 CFT provides actionable metrics and best practices that focus on cost concerns (programmatic, material, management, and execution) from all levels of aviation logistics and planning. Key areas of improvement or replication are identified through metric-based solutions that affect cost reductions throughout the AH-1Z and UH-1Y integration.				
14. SUBJECT TERMS Aviation Maintenance, Repair Cost, Cross-Functional Team			15. NUMBER OF PAGES 79	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UU	

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18

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**USMC AVIATION MAINTENANCE AND REPAIR COST
FOR THE H-1 UPGRADE**

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Submitted in partial fulfillment of the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

**NAVAL POSTGRADUATE SCHOOL
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USMC AVIATION MAINTENANCE AND REPAIR COST FOR THE H-1 UPGRADE

ABSTRACT

This research focuses on the Marine Corps Aviation Maintenance and Repair Cost for the H-1 Upgrade platform. Onsite visits with the Program Manager Air 276 (PMA-276), the Naval Supply Weapons Systems Support (NAVSUP WSS), the Defense Logistics Agency (DLA), and Marine Aviation Logistics Squadron 39 (MALS-39) are conducted to obtain information regarding readiness costs and efficiencies that have impacted the total cost for a transitioning aircraft in Marine aviation. PMA-276, NAVSUP WSS, DLA, and MALS-39 make up the H-1 Cross-Functional Team (CFT). The H-1 CFT provides actionable metrics and best practices that focus on cost concerns (programmatic, material, management, and execution) from all levels of aviation logistics and planning. Key areas of improvement or replication are identified through metric-based solutions that affect cost reductions throughout the AH-1Z and UH-1Y integration.

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LIST OF ACRONYMS AND ABBREVIATIONS

AAC	Acquisition Advice Code
AAMO	Assistant Aviation Maintenance Officer
ACES	Aviation Cost Evaluation System
ACPH	Actual Cost Per Hour
AFAST	Aviation Financial Analysis Tool
AFM	Aviation Fleet Maintenance
ALD	Aviation Logistics Department
ALPP	Acquisition Logistics Production Planning
AMC	Acquisition Method Code
AMO	Aviation Maintenance Officer
AMSC	Acquisition Method Suffix Code
APML	Assistant Program Manager Logistics
APN-6	Aviation Procurement Navy 6
APP	Aviation Plans and Policies Branch
APT	Aviation Program Team
ASDTP	Aviation Supply Desktop Procedures
ASL	Aviation Logistics Support Branch
ASM	Advanced Skill Management
AVDLR	Aviation Fleet Level Repairable
AVLOG	Aviation Logistics
A1	Tests and Checks
BCHP	Budgeted Cost Per Hour
BCM	Beyond Capable Maintenance
BOG	Boots On the Ground
BOR	Budget Operating Target Report
CAS	Cost Adjustment Sheet
CAT	Cost Analysis Team
CBIL	Common and Bulk List

CDRL	Contract Data Requirements Lists
CFT	Cross-Functional Team
CILR	Critical Items Logistics Review
CNAF	Commander Naval Air Forces
CNO	Chief of Naval Operations
CONUS	Continental United States
CPH	Cost Per Hour
CPI	Cost Performance Index
CR CFT	Current Readiness Cross-Functional Team
CRR	Cost Recovery Rate
C1	Full Repair Capability
C3	Limited Repair Capability
DAU	Defense Acquisition University
DCMA	Defense Contract Management Agency
DCN	Design Change Notice
DLA	Defense Logistics Agency
DLIS	Defense Logistics Information Service
DoD	Department of Defense
DPD	Data Product Deliverable
DSOR	Depot Source of Repair
DWCF	Defense Working Capital Fund
DVD	Direct Vendor Delivery
EAD	Earliest Arrival Date
ECP	Engineering Change Proposal
EDFP	Engineering Data For Provision
EI	Execution Index
ERP	Enterprise Resource Tool
ES	Existing System
FAR	Federal Acquisition Regulation
FHP	Flight Hour Program

FHPS	Flight Hour Project System
FLIS	Federal Logistics Information System
FLR	Field Level Repairable
FMC	Full Mission Capable
FMECA	Failure Modes, Effects, and Criticality Analysis
FRC	Fleet Readiness Center
FSC	Federal Stock Class
FST	Fleet Support Team
FW	Fixed Wing
FY	Fiscal Year
FYTD	Fiscal Year To Date
G-3	General Staff Level Operations
G-8	General Staff Level Force Development and Analysis
HQMC	Headquarters Marine Corps
ICAPS	Interactive Computer Aided Provisioning System
ICP	Inventory Control Point
ILSD	Integrated Logistics Support Department
IM	Item Manager
IOC	Initial Operational Capability
IPSOW	Informational Provisioning Work Statement
IRAC	Interim Rapid Action Change
ISIL	Interim Support Item List
ISP	Item Selection Process
ISQ	Initial Supply Quantity
ISS	Interim Supply Support
IWIST	Integrated Weapon Support Team
J&A	Justification and Approval
JEDMICS	Joint Engineering Data Management Information Control System
KP	Key Parameter
LEM	Logistics Element Manager

LORA	Level of Repair Analysis
LLTIL	Long Lead Times Items List
LSAR	Logistics Support Analysis Record
MAERB	Marine Aviation Executive Review Board
MAF	Maintenance Action Form
MAG	Marine Aircraft Group
MALS	Marine Aviation Logistics Squadron
MALS-39	Marine Aviation Logistics Squadron 39
MAPL	Maintenance Plan
MARFOR	Marine Forces
MAW	Marine Air Wing
MIF	Master Information File
MISO	Material Inter-service Officer
MMCO	Maintenance Material Control Officer
MSD	Material Support Date
MTBF	Mean Time Between Failures
NAE	Naval Aviation Enterprise
NAVAIR	Naval Air Systems Command
NAVICP	Naval Inventory Control Point
NAVSUP	Naval Supply Systems Command
NAVSUP WSS	Naval Supply Weapons Systems Support
NICN	Navy Item Control Number
NIIN	National Item Identification Number
NMC	Non-Mission Capable
NMCM	Non-Mission Capable Maintenance
NMCS	Non-Mission Capable Supply
NSN	National Stock Number
NWCF	Navy Working Capital Fund
OCO	Overseas Contingency Operations
OEF	Operation Enduring Freedom

OEM	Original Equipment Manufacturer
OIF	Operation Iraqi Freedom
OPSO	Operations Officer
OPTAR	Operating Target
OP-20	Operating Target 20
PBF	Provisioning Baseline File
PBL	Performance-Based Logistics
PCA	Physical Configuration Audit
PCCN	Provisioning Contract Control Number
PCO	Property Control Officer
PEO	Program Executive Office
PLISN	Provisioning List Item Sequence Number
PLT	Production Lead Time
PMC	Partial-Mission Capable
PMCS	Partial-Mission Capable Supply
PMSD	Pre-Material Support Date
PM	Program Manager
PMA	Program Manager Air
PMA-276	Program Manager Air 276
P/N	Part Number
POM	Program Objective Memorandum
PPL	Provisioning Parts List
PPLI	Provisioning Parts List Index
PPS	Provisioning Performance Schedule
PRS	Provisioning Requirements Statement
PSCN	Permanent System Control Number
PSICP	Program Support Inventory Control Point
PROAN	Provisioning Analyst
PR	Purchase Request
PSOW	Provisioning Statement of Work

RBA	Ready Basic Aircraft
RCM	Reliability Centered Maintenance
RFI	Ready For Issue
RFP	Request For Proposal
RFT	Ready For Tasking
RSO	Replenish Supply Quantity
SBTP	Sortie Base Training Program
SME	Subject Matter Expert
SM&R	Source Maintenance and Recoverability
SPI	Scheduled Price Index
SPR	Special Procurement Request
SRA	Shop Replaceable Assembly
SSMP	Supply Support Management Plan
SSR	Supply Support Request
S-3	Squadron Operations
TACAIR	Tactical Air
TDMP	T Dump
TMS	Type Model Series
TPDR	Technical Publication Discrepancy Report
T&R	Training and Requirements
TRR	Time to Reliably Replenish
TRW	TYCOM Readiness Workshop
TYCOM	Type Commander
UCIP	Unit Continuous Process Improvement Plan
USMC	United States Marine Corps
WSDC	Weapons System Designator Code
WSF	Weapon System File
WUC	Work Unit Code
X1	No Repair Capability

ACKNOWLEDGEMENTS

The author would like to acknowledge the following people for their support throughout the writing and review of this project report: my advisors, Professors Lawrence R. Jones and Donald Summers; Lieutenant Colonel Andre T. Harrell, USMC; Lieutenant Colonel Jack Abate, USMC; Major Narcisco Lopez, USMC; Major Robert Gordon, USMC; Major Wilburt Elliot, USMC; Felicia Barwell, DLA; Reva Clever, PMA-276; Raymond Schweigart, NAVSUP WSS; and all of my friends who were supportive during this process.

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I. INTRODUCTION

A. BACKGROUND

The Marine Corps has upgraded its helicopter fleet to include the light utility assault support (UH-1Y) and the light attack (AH-1Z) helicopter. This upgrade has had its share of difficulties, to include the acquisition of parts that provide rotary-wing close air support, antiarmor, armed escort, armed/visual reconnaissance, fire support coordination, command, control, and assault support capabilities under day/night adverse weather conditions for the United States Marine Corps (USMC) (Naval Air Systems Command [NAVAIR], 2010). These upgraded aircraft incorporate new, state-of-the-art designs that serve to improve capability, lethality, and survivability. Major modifications consist of a new, four-bladed rotor system with semiautomatic blade fold of the new composite rotor blades, innovative performance-matched transmissions, a new four-bladed tail rotor and drive system, upgraded landing gear, and pylon structural modifications. These modifications provide increased load-carrying ability, greater range and survivability due to the commonality of parts between the UH-1Y and the AH-1Z. Within those modifications, both aircraft share 84 percent identical parts that are provisioned by the Defense Logistics Agency (DLA), Naval Supply Weapons Systems Support (NAVSUP WSS), and the Program Manager Air 276 (PMA-276). Those agencies, to include Marine Aviation Logistics Squadrons (MALs), are members of the Marine Corps aviation logistics community's Cross-Functional Team (CFT). The 84 percent commonality will improve component inventory for both wholesale and retail levels in the out-years by decreasing the range¹ and increasing the depth² of the parts necessary to support training and combat operations (NAVAIR, 2010).

The Marine Corps manages and tracks the costs for all Type Model Series (TMS) aircraft through the Sortie Base Training Program (SBTP) and the Flight Hour Program

¹ Range: Number of different parts/components within an inventory (wholesale or retail) with an allowance greater than zero.

² Depth: An allowed item in which the on-hand quantity is equal to or greater than the authorized allowance.

(FHP), which utilizes monthly Budget Operating Target Reports (BORs) to track operating costs. The SBTP is the commander's execution tool and the FHP is the budgeting tool. The BORs are used to populate a tool known as the Aviation Cost Evaluation System (ACES), which compares the actual (executed) monthly Cost Per Hour (CPH) to the budgeted fiscal year CPH target known as the Operating Target 20 (OP-20).³ The OP-20 CPH consists of Fuel, Aviation Fleet Maintenance (AFM), Aviation Fleet Level Repairable (AVDLR), Contract Maintenance Support, and Flight Hours. With the creation of a new TMS aircraft, there exists a Pre-Material Support Date (PMSD) for parts that are provided to the end user at no charge. Conversely, once the Material Support Date (MSD) is realized, the unit's funding account is charged to the FHP (Headquarters, United States Marine Corps [HQMC], 2009).⁴

The MSD for the AH-1Z is scheduled for January 2013. The MSD for the UH-1Y was July 2010. Currently, the targeted budget CPH for the AH-1Z is \$659.60. The actual AH-1Z CPH from October to April 2011 was \$1964.60. This is 198 percent over budget. The targeted CPH for the UH-1Y is \$3443.70. The actual UH-1Y CPH execution from October to April 2011 was \$1,668.49; 52 percent under budget. This budget situation is a cost anomaly. The AH-1Z is in the pre-MSD period whereby the cost for AFM and AVDLR components are being charged to Aviation Procurement Navy 6 (APN-6) and not the FHP program through the Navy Working Capital Fund (NWCF) for retail expenditures and sales. Therefore, the budgeted CPH is expected to be much higher than the actual CPH. Also, since there is an 84 percent commonality between the UH-1Y and AH-1Z when MSD was established for the UH-1Y, the Cognizance symbol (Cog) was changed from a free issue (0 Cog) to a chargeable financial obligation (1, 3, 7, or 9

³ Aviation Cost Evaluation System: ACES is a software application that tracks aviation costs by allowing the input and import of Budget Operating Target reports. ACES is one of the primary tools used by USMC Cost Analysis Teams and Tier I-IV (Marine Aviation Logistics Squadrons (MALS), Wing, Marine Forces, Headquarters Marine Corps, and Chief of Naval Forces) supported/supporting organizations to identify and manage execution and budget cost by TMS.

⁴ Material Support Date: The date when the NAVSUP WSS activity will provide a full range and depth of spares and repairs required to perform maintenance based on the maintenance plan. Additionally, funding for the program is sourced from NWCF vice APN-6. It serves as the transition point between interim contractor support and implementation of the final maintenance and support strategy.

Cog).⁵ These parts became chargeable to the AH-1Z regardless of the Pre-MSD period. Heretofore, the CPH for each platform is still the lowest in Marine Aviation, which is in stark comparison to both legacy and new platforms (i.e., MV-22) as seen in Figure 1, the CPH chart for April 2010 (Harrell, 2011).

Chart definitions are as follows:

- **EI:** Execution Index is the previous 2-year average, with FYTD CPH (AVDLR, AFM, and FW) adjusted into current year dollars compared to the current FYTD, up to and including the applicable month. Greater than 1.00 = spending less than previous FY, less than 1.00 = spending more than previous FY. (Previous AVDLR, AFM, and FW/Current AVDLR, AFM, and FW) = EI. Fuel is NOT included in the calculation.
- **CPI:** Cost Performance Index is the Earned Value (Budgeted CPH x Executed Flight Hours) divided by Actual CPH x Executed Flight Hours. Greater than 1.00 = costing less than budget (Under Budget), less than 1.00 = costing more than budget (Over Budget). AVDLR, AFM, Fuel, and Contract are used in the calculations. $(BCPH \times \text{Executed Flight Hours}) / (ACPH \times \text{Executed Flight Hours}) = CPI$.
- **SPI:** Scheduled Performance Index is Earned Value (BCPH x Executed Flight Hours) divided by BCPH x Planned Flight Hours. Greater than 1.00 = flying more than planned, less than 1.00 = flying less than planned. AVDLR, AFM, Fuel and Contracts are utilized in the computations $(BCPH \times \text{Executed Flight Hours}) / (BCPH \times \text{Planned Flight Hours}) = SPI$.
- **ACPH:** Actual Cost Per Hour is Fuel, AFM, AVDLR, and Contracts divided by Executed Flight Hours.
- **BCPH:** Budgeted Cost Per Hour is Fuel, AFM, AVDLR, and Contracts divided by Budgeted/Planned Flight Hours (Harrell, 2010).

⁵ Cognizant Symbol: Two-digit code that identifies the stores account and the inventory manager. 9B and 3B cogs are managed by DLA. 1R, OQ, OR, and 7R Cogs are managed by NAVSWSS. 0 Cogs are paid with APN-6 funding, which is used at Pre-MSD or initial allowancing. 9, 3, 1, and 7 Cogs are paid through the NWCF and charged to the FHP under the cost per hour construct.

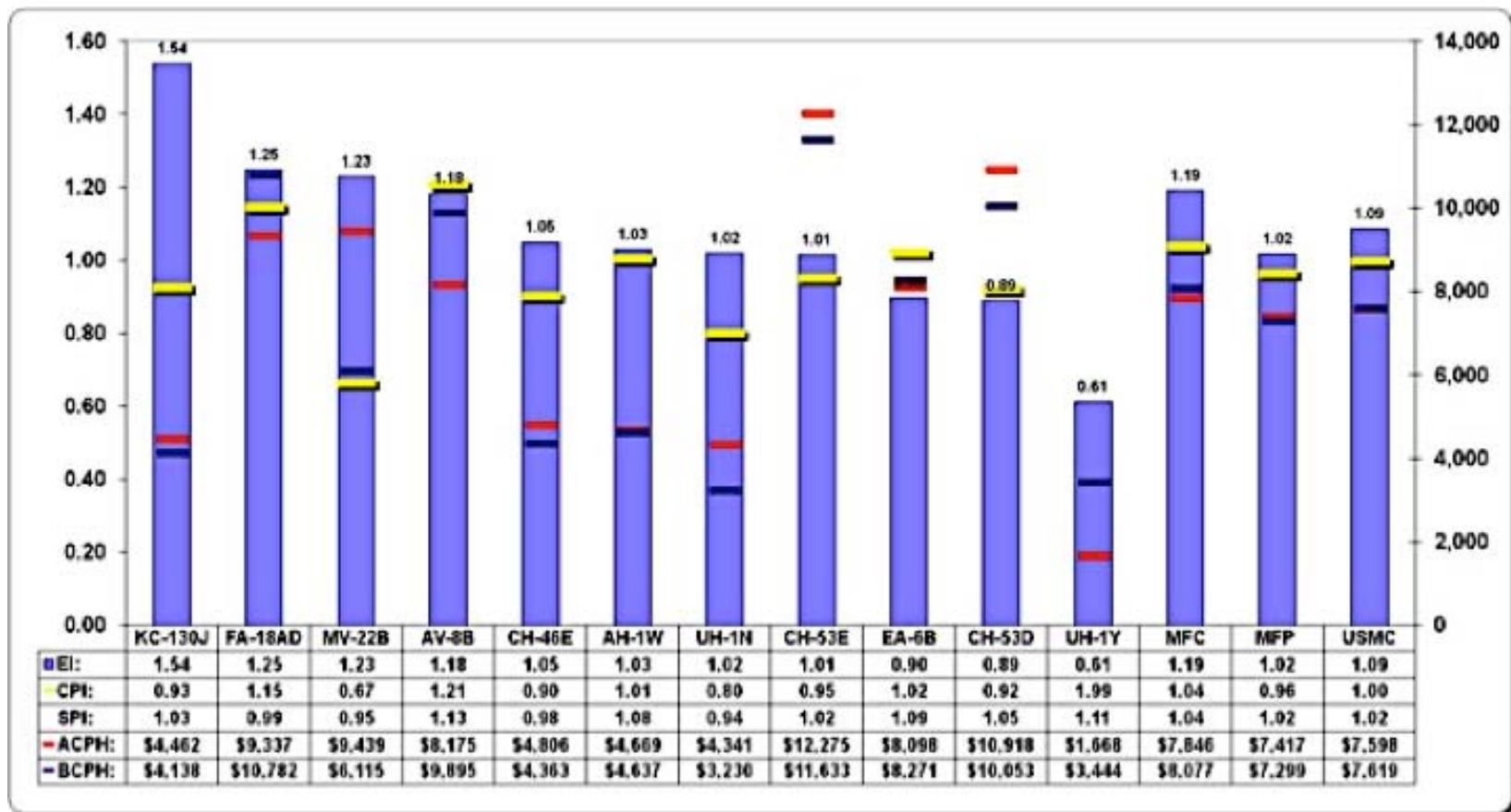


Figure 1. USMC ACES Indices Cost Performance Chart
(From Harrell, 2011).

These data points are used by the CFT and Cost Analysis Team (CAT) to track and review monthly execution of the FHP pertaining to effectiveness (material and aircraft readiness) and efficiency (actual versus planned resource allocation). The root cause analysis is performed by the CFT and CAT to link aircraft readiness to material trends, cost factors, and management engagement. The following issues highlight the main concerns with all stakeholders regarding cost analysis.

- Reliability of components.
- Increase in Intermediate (I-level) repair at the Marine Aviation Logistics Squadron to avoid Beyond Capable Maintenance (BCM) Actions to the Original Equipment Manufacturer (OEM) for final disposition and repair.
- Identification of high cost, high demand AFM parts (consumable and field level repairable components) by the Cross Functional Team (PMA, NAVSUP WSS, DLA, MALS, Bell, and the Fleet Support Team) that experienced price reductions after MSD.
- Due diligence of the H-1 Cost Analysis Team led by the MALS-39 Commanding Officer to track, identify, resolve, and inform the CFT of any negative trends related to cost trends; albeit spikes in demand, reliability concerns (if applicable), or cost increases affecting the actual CPH (Harrell, 2011).

Costs for the AH-1Z are not captured in Figure 1 because MSD is in January 2013, and the Commander Naval Air Forces (CNAF) only tracks costs for platforms that are post-MSD. For this reason, the UH-1Y is the main focus of this research paper because it reached MSD in July 2010.

The H-1 aviation logistics (AVLOG) community must continue to focus on cost performance and reduction initiatives by ensuring the CFT and the CAT provide the necessary strategic communication to align AVLOG support with manageable cost projections that will avoid unplanned increases in CPH throughout the life of the platform. The CFT strategic plan involves engaged and proactive action pertaining to:

- Cost Analysis.
- Partnering and collaborating with Bell, NAVSUP WSS, and the CFT to ensure both retail and wholesale stock levels are satisfied based on demand projections.

- Review of scheduled removal components (high time or retirement life items) to ensure material availability for the MALS and OEM/Depot in order to avoid repair cycle delays.
- Forecasting piece part requirements through DLA and NAVSUP WSS based on historical demand data provided by the Fleet Support Team and the MALS.
- Acceleration of Depot Artisan Support (i.e., BCM Interdiction) at the I-level to avoid BCM actions and AVDLR charges for net price repair at the Depot or OEM.⁶ The organic depot for the H-1 Upgrade for Airframes, Rotors, and Drives will be at Fleet Readiness Center East in Cherry Point, North Carolina. All Avionics will be repaired at Fleet Readiness Center (FRC) South West in San Diego, California. Both Depots are projected to be functional in FY14/15. The Depot Publications are expected to be complete by FY13. The MALS can help reduce cost for many of the dynamic components that will be repaired at the Depot by requesting Artisan Support prior to the projected stand up dates in FY14/15 (Headquarters, Marine Corps Aviation Plans and Policies [HQMC APP], 2011).

As a cross-functional team effort, the AVLOG community should synchronize their material, maintenance, and management support and communication for providing adequate aviation parts for the new upgraded H-1 aircraft. Synchronization and alignment will standardize, improve, and sustain effective cost analysis methods that will maintain the cost performance expected in the fiscal out years for critical component items.

B. OBJECTIVE

The objective of this research is to identify best practices associated with the cost performance of the H-1 upgrade platform. The main focus of this research will be directed to the UH-1Y since it has reached post-MSD. To reach this objective, this research will analyze supply chain management processes within the MALS, DLA, NAVSUP WSS, and PMA-276 and conduct an evaluation of H-1 Upgrade performance data. This research will also aid in better allocating of funding and resources for repair parts and provide accurate forecasts for projected material requirements.

⁶ BCM Interdiction: A Fleet Readiness Center program that allows Artisans to reside at the MALS and perform Depot-related repairs at the local level. The intent is to reduce BCM actions, which will decrease AVDLR cost for a specified platform.

1. Primary Research Question

Can USMC Aviation Maintenance and repair systems become modified to smooth out workload flow?

2. Supporting Question

Is it possible to make a better projection of demand, and the subsequent cost to the FHP, to improve budget execution in the current year and future years in order to justify Program Objective Memorandum (POM) submissions and align planned versus actual cost execution in the Fleet?

C. SCOPE OF REPORT

The purpose of this project is to conduct an analysis to improve cost reporting, execution, budgeting, and analysis for aviation maintenance and supply for the upgraded H-1. Solutions to any current problems identified during this research will be recognized.

D. METHODOLOGY

Various steps and procedures were conducted during the course of this thesis research. Data for this research were collected at the following locations:

- At Marine Aviation Logistic Squadron 39 (MALS-39) Camp Pendleton, California, the MALS-39 CO provided the cost charts that target historical patterns of the H-1 AVDLR and AFM cost.
- At PMA-276 in Patuxent River, Maryland, a review of the FHP Budget Process, Cost Reporting for the Naval Aviation Enterprise, and the identification of the cost initiative were conducted with regard to cost execution and budget planning at Tier levels 1 through 4.
- At NAVSUP WSS, Philadelphia, Pennsylvania, a review of discussed milestones, decision dates, contract repair provisioning, procurement of AVDLR and AFM components and best business practices was conducted to ensure material availability for future requirements.

- At DLA, a review of pre- and post-material support dates, and how they affect material pricing and material availability.

Once the data have been collected, information will be applied in a manner to answer the two research questions. Based on this analysis, problems (if any) will be categorized into different subject areas: cost, reliability of parts, and top degrader issues.

E. ORGANIZATION OF REPORT

The report contains seven chapters. Chapter I provides an introduction that includes sections on background, purpose, scope and methodology, and a statement of primary and secondary research questions. Chapter II describes the CAT, which breaks down the roles and responsibilities of Tiers 1 through 4. Chapter III describes the methodology. Chapter IV describes the supply chain management process within PMA-276. Chapter V describes the supply chain management process within the NAVSUP WSS, while Chapter VI describes the supply chain management process within DLA. Finally, Chapter VII presents observations, conclusions, and recommendations.

II. CROSS-FUNCTIONAL COST ANALYSIS TEAM (CAT)

A. INTRODUCTION

This chapter focuses on how Marine Aviation's dependent roles and responsibilities are all linked to improving capabilities, lethality, and survivability within any TMS aircraft. Without collaboration, these roles and responsibilities can disrupt the flow of repair capability that will eventually drive up costs because key information was not distributed or elevated to the proper person or activity. This chapter will also discuss the purpose, tier breakdowns, tier responsibilities, and benefits from the establishment of the CAT. This is important because the CAT sets the tone for the root cause analysis that provides an understanding of managing the workload flow of maintenance and repair systems. This leads to improved budget execution, better demand projections, and more precise consequent cost projections to the FHP for validating current and future POM submissions.

B. PURPOSE

The Cross-Functional CAT is a four-tiered group aimed at providing cohesive, full-spectrum cost visibility, analysis, and direction to TMS Team Leads in an effort to more effectively manage cost elements. Tier-level roles and responsibilities are provided in Figures 2 and 3. Since the inception of the CATs in January 2010, the H-1 community has experienced involvement at various stages. CATs demand participation from maintenance personnel and operators. This direct squadron feedback provides the root causal factors to material execution that cannot be extracted from Aviation Financial Analysis Tool (AFAST) or ACES. This analysis requires a CFT approach from all levels in order to understand, manage, and reduce costs where applicable. Maintenance personnel and operator involvement is essential and provides an important piece for attainment. As a collective effort, all tiers aid the TMS Lead and Team in updating cost-related data and trends at all Naval Aviation Enterprises. These tiers include TMS Team meetings, the Type Commander (TYCOM) Readiness Workgroup (TRW), and MAL in

better allocating their funding and resources for repair parts and provide accurate forecasts for projected material requirements.

The Current Readiness Cross-Functional Team (CR CFT), the Marine Aviation Executive Review Board (MAERB), and the Air Board will participate at the invitation of the TMS Team when uncommon cost circumstances or conditions arise (HQMC APP, 2011).

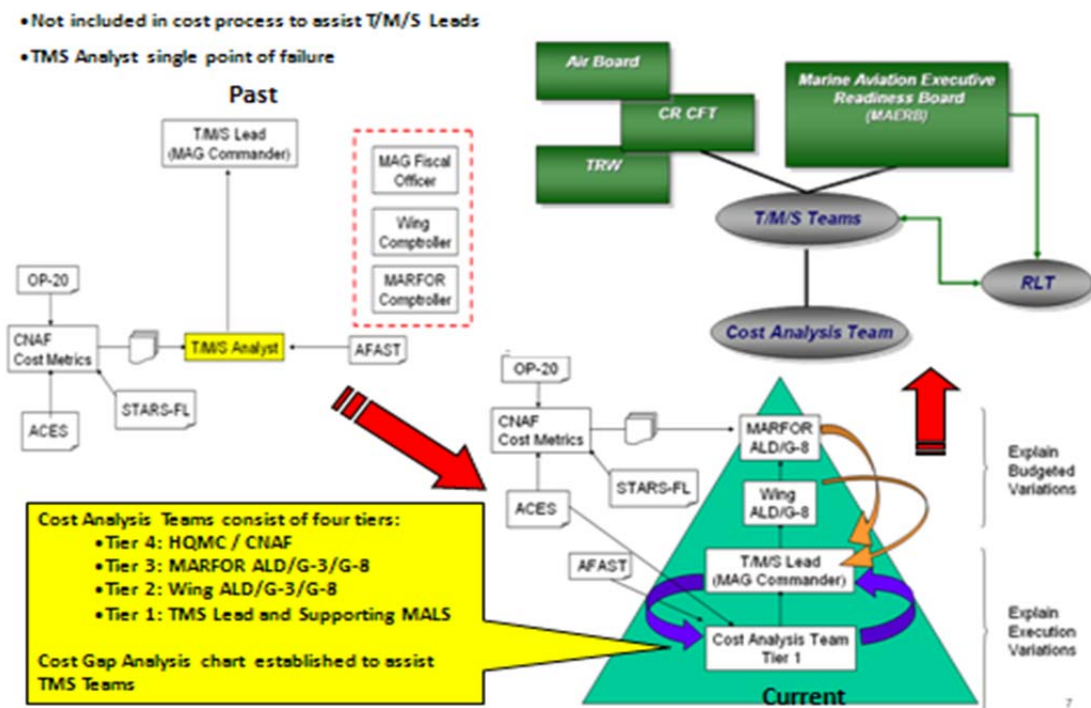


Figure 2. Cost Analysis Team Chart 1 (From HQMC APP, 2011).

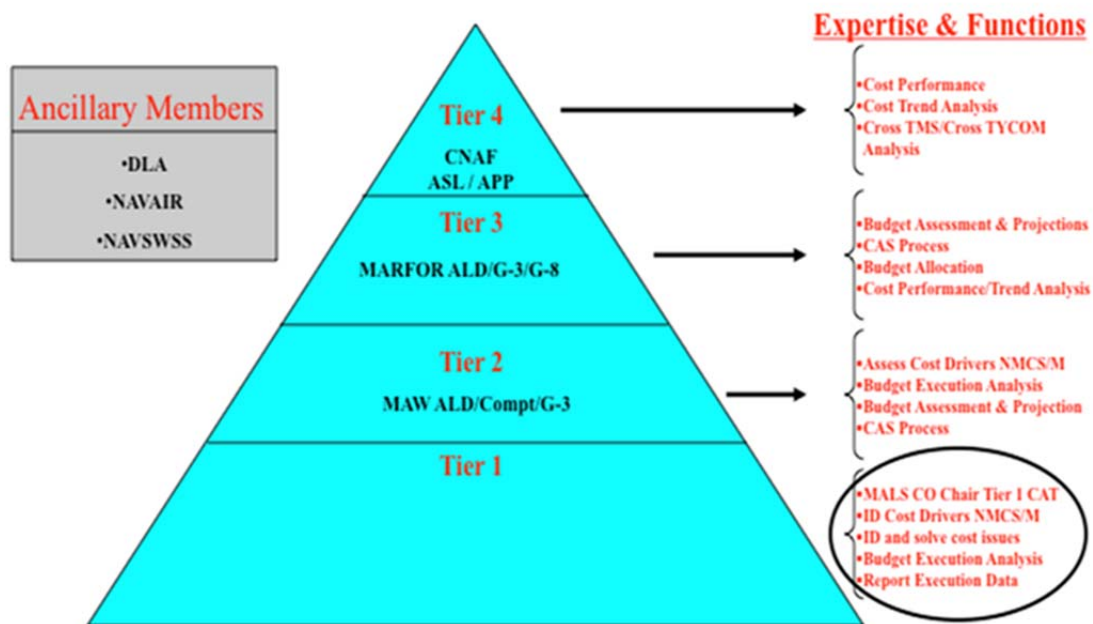


Figure 3. Cost Analysis Team Chart 2 (From HQMC APP, 2011).

C. TIER BREAKDOWN

In this section, the tier breakdown shows how each tier can be simulated across the Fleet to similar and dissimilar TMS aircraft, as depicted in Figure 3. This standardizes the overall process and creates continuity throughout the Fleet. Within Tier 1, the TMS Logistics Lead (Lead MALS CO) will head his or her particular TMS Tier 1 CAT. Additional members within Tier 1 include the MALS Supply, Ordnance, and Maintenance Officers; Supporting MALS with the same TMS aircraft from other Marine Aircraft Group (MAG) units; operational squadrons' Aviation Maintenance Officer (AMO), Assistant Aviation Maintenance Officer (AAMO), Material Maintenance Control Officer (MMCO); and Squadron Operations (S-3), MAG Current Readiness Action Officer and TMS Analyst. This group will identify the cost drivers that keep aircraft in a Non-Mission Capable (NMC) status and Partial Mission Capable (PMC) status, identify and solve cost issues, perform budget execution analysis, and report needed execution data up the line.

Tier 2 includes the Wing Aviation Logistics Department (ALD), General Staff level Operations (G-3), and General Staff level Force Development and Analysis (G-8) that perform an assessment of the Non-Mission Capable Supply (NMCS) or Partial Mission Capable Supply (PMCS) cost drivers that help create the baseline for the Cost Adjustment Sheet process (CAS) through historical budget execution that is reported by the Tier 1 group. Tier 3 includes Marine Forces Pacific (MARFORPAC), (ALD), G-3, and G-8. Tier 4 includes Headquarters Marine Corps (HQMC), Aviation Logistics Support Branch (ASL), Aviation Plans and Policies Branch (APP), and CNAF. Ancillary members include NAVAIR, NAVSUP WSS, DLA, and the OEM or Depot. Tiers 3 and 4 share the responsibility of continued analysis of cost performance and historical trends of those NMC status and PMC status cost drivers within the budget assessment, while projections continue to further support the CAS process and budget allocations that are passed down through Tiers 1 and 2 (HQMC APP, 2011).

D. TIER RESPONSIBILITIES

The responsibilities of Tier 1 involve directing biweekly meetings with main operational squadron personnel (i.e., Aviation Maintenance Officer, AAMO, MMCO, and Operations Officer (OPSO) by reviewing historical information from ACES and AFAST data. These meetings help pinpoint trends and aid in identifying root causes for top cost drivers that assist in identifying, explaining, and justifying cost variances. This, in turn, will help recognize ways to reduce costs through efficient or improved business practices. The Tier 1 group also functions as the lead for the semiannual Cost War Room meetings hosted by CNAF. This group provides a report to the Cost Tier community regarding historical (six month's) cost, readiness, and material issues or concerns. The purpose of these meetings is to provide a Cost Gap Analysis chart to their respective TMS Lead and Tiers 2 to 4 for all Naval Aviation Enterprise (NAE) briefing settings. Tiers 2 to 4 possess the responsibilities that provide the TMS Lead with an increased level of effort, participation, scope, and expertise linked to cost. They also feed cost expertise on cost data to TMS Teams in the following areas: cost drivers (Non-Mission Capable Supply/Non-Mission Capable Maintenance), contract maintenance support, and

budget execution analysis, as required, for inclusion in briefing cost-related data and trends at all NAE briefing venues (HQMC APP, 2011).

E. BENEFITS

The first benefit of the CAT enables the TMS Logistics Lead to become the TMS voice of the Fleet. A second benefit of the CAT contributes to delivering monthly detailed cost explanations, expertise, and visibility in direct support of each TMS Lead and Team. A third benefit of the CAT facilitates stabilization between TMS Teams, Marine Aircraft Wings (MAWs), and Marine Forces (MARFOR) to allow for a better integration of cost-related subject matter experts (SMEs) to enter into the Current Readiness process and offer essential guidance in support of TMS Team battle rhythms. By establishing and maintaining monthly battle rhythms, a successful reinforced level of effort and level of expertise is gained at Tiers 1 to 4. This ensures that communication at all levels, with regard to cost, will allow the placement of the right Marines, in the right place, at the right time. Overall, these benefits provide for a more all-inclusive and integrated cost management process, which establishes a transparent requirement for the MARFORs' and MAW ALD/Comptrollers' involvement within the NAE process. As TMS Teams continue to look for ways to improve cost initiatives, the development of their battle rhythms will consistently become evident due to the SMEs' ability to gain experience in researching/analyzing cost data. The end result will consistently allow the TMS Teams to better answer cost issues due to multidisciplinary teamwork and open communication (HQMC APP, 2011).

F. CONCLUSION

The CAT is an essential part of the CFT approach to managing workload flow, and reducing OP-20 costs. Without required feedback, maintenance and supply personnel could not provide the additional root causal factors associated with generating material execution and improved efficiency due to the limited information provided by ACES. The tier breakdown and responsibilities assist in reporting required information up the line that assists in creating a clearer picture of identifying and solving cost issues that improve maintenance and repair workload flow and demand projections. These improvements develop better budget execution that justifies current and future POM submissions. The next chapter will discuss how Marine Aviation elements contribute to improving maintenance workload flow and validating current and future POM submissions.

III. METHODOLOGY

A. INTRODUCTION

This chapter introduces the method of how the CFT approach brings together cost and repair elements of Marine Aviation. This is the key to improving maintenance repair workload flow, and to improving budget execution that justifies current and future POM submissions. It starts with the MALS identifying cost drivers that lead to more capabilities gained efficiencies. Gained efficiencies, AVDLR requirements, price challenges, AFM requirements, contract maintenance support, and fuel will be addressed within the methodology.

B. MARINE AVIATION LOGISTICS SQUADRON (MALS)

The purpose of the MALS is to support the O-level squadrons by identifying cost drivers that cause aircraft to become NMCS and PMCS. As a member of the CFT, the MALS should identify and solve cost issues based on historical data, trend analysis, and cross-functional communication to assist in more accurate cost estimations and budget execution analysis. Once this data is reviewed, it is reported up the line to the next higher tier to further the process of overall cost reductions across the Fleet. The end state of a MALS should focus on increasing Ready For Issue (RFI) rates and reducing BCM rates. This effort involves identifying every possible way to RFI a component based on the different maintenance codes (e.g., C1 [full repair capability] and C3 [limited repair capability]) to allow for the I-level and depot maintenance to simultaneously make repairs. As long as the I-level is repairing components, the Fleet is only paying for parts that are needed to fix or RFI those components as compared to replacing the entire component, which is always at a higher price (Harrell, 2009).

There are some items in which the MALS has no repair capability (X1 items). Once those items have been identified, the Property Control Officer (PCO) and AMO should collaborate with the Fleet Support Team (FST). This collaboration consists of obtaining more capability on those identified items in order to allow for more tests and

checks (A1 items) or C3 capability. By gaining more capability at the MALS or I-level, the percentage of demand that is gained will save AVDLR cost in the long term (Harrell, 2011).

C. WORKLOAD FLOW STRATEGY

1. O-I Level Maintenance Workload Flow

With the implementation of the End-to-End *AirSpeed* initiative, there has been an increase in efficiencies gained at the organizational level (O-level) or flying squadron level and the I-level or MALS-level. It starts with ensuring that the maintainer or journeyman has the necessary parts in place in order to keep and return aircraft back to Full Mission Capable (FMC) status. This is a matter of coordinating that workload flow at the flying squadron or O-level and applying it to the I-level production schedule. Once the coordination progresses, it allows for strategic communication at the Depot-level that filters down to support the O-level to I-level interface of streamlining the workload flow process, which is the implementation of the End-to-End *AirSpeed* (Harrell, 2009).

In order to accomplish this implementation at the I-levels and O levels, maintainer qualification through the Advanced Skills Management (ASM) system must be sustained. As maintainers obtain their qualifications and are able to gain appropriate practice on aircraft, they are able to acquire those basic maintainer journeymen, master mechanic skill sets that will lead to better troubleshooting of aircraft gripes and components that affect readiness. By having better troubleshooting skills, it saves the maintainer from ordering excessive parts, and also prevents further BCM actions when the MALS does not have repair capability. This allows for aircraft management and material requirements to be addressed. The O-level aircraft management and material requirements consist of:

- Coordinating aircraft availability.
- Meeting squadron readiness and training requirements.
- Forecasting the number of aircraft needed for daily operations.
- Identifying and communicating factors up the line that cause Ready Basic Aircraft (RBA) or Ready For Training (RFT) aircraft to become NMCS or PMCS.

At the O-level, there are some questions that should be addressed regarding aircraft management and material requirements.

- Are O-level squadrons receiving satisfactory support from the CFT community to meet their readiness goals and training requirements?
- Is the O-level Operations Department coordinating with the O-level Maintenance Department regarding aircraft availability projections to meet the SBTP?
- Is the O-level S-3 correctly forecasting the number of aircraft needed for day-to-day operations to meet the O-level training and requirements (T&R)?
- If O-level Maintenance does not have enough aircraft that are RBA or RFT, then what are some of the causal factors and how is this information being communicated to the NAE, CFT, TMS Lead, and TMS Logistics Lead (i.e., monthly 3M meetings, weekly AMO maintenance meetings, NMCS/PMCS High Priority meetings, current readiness meetings, etc.)?

These questions are the key to gaining efficiencies at the I- and O-level because they directly address squadron schedule or removal issues of parts that degrade aircraft's full mission capable status. For example, when a main rotor hub or transmission comes off of aircraft due to scheduled high-time maintenance or unscheduled maintenance, it can lead to an increase in CPH because the increase in ordering those mission-degrading parts drives up the CPH. Therefore, as O-level Operations and O-level Maintenance are strategically communicating to one another, the End-to-End has helped the O-level gain some efficiency that allows a more efficient output in the long run (Harrell, 2011).

2. AVDLR Material Requirements

The reliability of AVDLR material requirements, based on Fleet demand projections, is a key indicator of whether the wholesale and retail stock levels are in good standing at NAVSUP WSS. These stock levels are dependent on AVDLR material requirements that are reliably met. This is determined by whether or not those material requirements are meeting their scheduled maintenance and material overhaul dates

(Harrell, 2009). One way to help reduce cost is to focus on the Critical Items Logistics Review (CILR) listing that contains the top 20 AVDLR cost degraders that are tracked by work unit code (WUC). The reliability of those parts helps improve overall time on wing. Of the advertised mean time between failures (MTBF) rates, 10,005 components fall into this category overall at the O-level. A further look shows that 8,692, or 86 percent, of those components had a type maintenance code of B, which represents unscheduled maintenance as the main cause that is reflected on O-level maintenance action forms (MAFs). From that MAF information, the top 10 AVDLR components have been identified as not meeting their MTBF rates, with a total support cost of \$30,963,992. As a result of identifying these top 10 components, the Fleet is able to determine what components are driving up AVDLR cost (Clever, 2011).

Figure 4 is very useful in identifying those high-cost components attributed to MTBF. These parts affect the CPH when the Cog rolls over to a 7R (AVDLR) and the material cost when billed to the FHP, if they are not properly addressed.

WUC	DESCRIPTION	HEAD NIN	COG	QTY	SUPPORT COST RANK	SUPPORT COST
1522113	MAIN ROTOR YOKE ASSY (UPR/LWR)	01-523-8226	0R	2	1	\$9,009,466
1522A	MAIN ROTOR CUFF ASSY **	01-523-8235	0R	4	2	\$7,115,706
46640	OBIGGS GENERATOR	01-523-8289	0R	1	3	\$4,966,256
15232	MAIN ROTOR POWER MODULE	01-523-8282	0R	2	4	\$2,926,209
1522140	MAIN ROTOR ADAPTER ASSY **	01-523-8232	0R	4	5	\$1,646,089
26540	INTERMEDIATE GEARBOX ASSY (IGB) (42 DEG) **	01-523-8190	0R	1	6	\$1,134,807
2657F00	LH FORWARD/AFT BRAKE ASSY	01-523-8104	1R	2	7	\$1,108,931
64837	PILOT/COPILOT HEADSET CORD ADAPTER CABLE ASSY	01-524-0860	1R	2	8	\$1,083,008
15230	MAIN ROTOR ACTUATOR ASSY	01-523-8229	0R	2	9	\$1,006,282
15330	TAILROTOR CONTROLS ASSY **	01-524-1623	1R	1	10	\$967,237
						\$30,963,992

Figure 4. UH-1Y AVDLR Eye Chart June 2010–July 2011(From Clever, 2011).

Based on those components associated as failure rates depicted in Figure 4, the following question originates: What is PMA-276 doing to offset these failure rates now and in the future?

An engineering change proposal (ECP) will help offset those failures in future years. ECPs are designed to reveal the total system impact including effects on other items, changes to and impact on logistics support, and a complete analysis of the impact of a component produced on a contract (Provisioning Analyst Desk Guide, 2008). From the use of the ECP to the component itself, an increase in reliability of RFI parts will decrease cost over a period of time due to key communication and feedback based on the information gained from the O-level MAFs. This type of initiative will thrive to improve the workload flow because the O-level Operations collaborate with O-level Maintenance by assisting the process of identifying the MTBF. The supply expeditor collaborates with the MMCO to ensure that the correct parts are being ordered. From this collaboration, effective aircraft management, troubleshooting, and scheduling are essential to flight line readiness. Ordering the correct parts, based on Work Unit Code discrepancy and mature troubleshooting techniques, will assist in reporting accurate up the line data to PMA-276 to validate an ECP action. Another contributing factor lies with whether the maintainers are qualified (Harrell, 2011).

Between post-MSD (July 2010 and now), based on the UH-1Y CPH, projections were under execution of the target OP-20. This means the Marine Forces Pacific (MARFORPAC), Aviation Program Team (APT), and PMA-276 did an outstanding job of coordinating with each other.⁷ Recall earlier that AVDLR components were identified as to which parts did not meet their MTBF rates. In addition, the projected AVDLR cost execution from October to April was \$4,894,419.35 (Wecksler, 2011).

Based on that time frame, the AVDLR execution portion for the UH-1Y, when compared to what was projected in the OP-20, was \$2,335,302. In this case, the AVDLR execution was not under what was projected in the OP-20. If it were opposite, then a closer look would be needed to see if MARFORPAC is aligned with Fleet cost execution. This would raise the question of whether there a misunderstanding with what is going on with Fleet cost execution. This is extremely important because the projections for

⁷ Aviation Program Team: Ensures all aspects of aircraft safety (flight, ground, and industrial) are adequately addressed. An APT is required by Defense Contract Management Agency (DCMA), and is strongly recommended for Navy/USMC contracts.

AVDLR cost execution, AFM cost, and overall Fleet CPH execution should be on track with what the Fleet is executing from a material perspective. Once this process has been smoothed out, it will allow for a reduction in cost on a sustained—not monthly—basis (Wecksler, 2011).

3. AFM Material Requirements

The AFM portion of the OP-20 is just as important as the AVDLR portion. Looking at AFM demand, and what is causing it to be driven upward, is another focus that the I-levels and O-levels need to address. For example, high-cost AFM field-level repairable (FLR) components that have a fatigue life, to include scheduled removal items and high-cost AFM components that do not have a scheduled removal, should be identified and elevated up to PMA-276 and NAVSUP WSS. This will help improve maintenance and repair workload flow and reduce costs. Figure 5 shows the top 10 scheduled removal components that are tied to AFM support cost.

WUC	DESCRIPTION	HEAD NIIN	COG	AFM RANK	SUPPORT COST
64837	PILOT/COPILOT HEADSET CORD ADAPTER CABLE ASSY	01-524-0860	1R	1	\$1,083,008
2657F00	LH FORWARD/AFT BRAKE ASSY	01-523-8104	1R	2	\$1,108,931
4231140	AIRCRAFT BATTERY	01-505-1300	9B	3	\$778,968
29H17B3	LDS JACKSHAFT ASSY	01-524-0727	1R	4	\$741,994
15330	TAILROTOR CONTROLS ASSY **	01-524-1623	1R	5	\$967,237
2653300	TAILROTOR DRIVE FLEX COUPLING ASSY **	01-523-8012	1R	6	\$774,053
69000	MISCELLANEOUS COMMUNICATIONS SYSTEMS	SYSTEM		7	\$293,822
64000	INTERPHONE SYSTEMS	SYSTEM		8	\$259,932
2653100	NO. 1 TAILROTOR DRIVESHAFT HANGER COUPLING ASSY **	01-523-8020	1R	9	\$576,207
15110	MAIN ROTOR SWASHPLATE ASSY **	01-554-6505 / 01-589-4165	7R	10	\$383,717
					\$6,967,870

Figure 5. UH-1Y AFM Eye Chart June 2010 to July 2011 (From Clever, 2011).

Another AFM example of identifying material demand was utilized before pre-MSD of the UH-1Y at MALS-39. MALS-39 identified the top 100 cost drivers for AFM. Of those top 100 identified, since post-MSD, MALS-39 has already seen price adjustments that have helped overall AFM price execution. These top 100 cost drivers

were elevated up to DLA and PMA-276 in an effort to reduce costs. This is an element of the CFT's partnering, collaboration, and participation (Harrell, 2009).

4. Price Challenges

In order to further pursue actions to improve workload flow and budget execution to justify current and future POM submissions, there are Fleet actions that can be implemented in a timely manner at the I-level to reduce overall OP-20 costs. There will be certain instances where the pricing of particular AVDLR parts is too high. In these cases, it is practical to look at that particular cost and pursue a price challenge to the correct agency. At the I-level, this tool has already been implemented. The I-level or MALS will issue a price challenge to DLA or NAVSUP WSS. In return, NAVSUP WSS coordinates with the Fleet Readiness Centers (FRC) (Depot) to validate and adjust their prices. The price challenge is a formal way of identifying that a price is too high in comparison to historic pricing. For example, when comparing a transmission that cost \$370,000 a year ago to the same transmission that today costs \$540,000, the price challenge inquires as to why is there a price increase for the exact same component. It also allows the source of supply to conduct the proper research in order to see why that price is so high. As a result, that price could be reduced from 10 to 25 percent above last year's price. This is an example of how the Fleet offsets price increases, improves workload flow, and brings down costs for AFM or AVDLR components (Harrell, 2009).

5. Contract Maintenance Support

Currently, the RESET/Preset contracts operate out of Overseas Contingency Operations (OCO) funding, which are used specifically for resetting or returning the tactical squadrons' aircraft back to RBA status due to wear and tear of continuous deployment cycles. Because of congressional budgetary constraints, the RESET/preset contracts renew every six months. The training squadrons also have a maintenance contract that is currently utilizing an option year, with the last option year commencing in FY 2014. These training squadron maintenance contracts operate from baseline funding or OP-20 funding and are utilized to augment and train Marines in those basic journeyman maintenance skill sets, but not to replace the individual Marine maintainer.

In an effort to reduce overall costs, the question is: Can the Marine Fleet reduce the tactical squadron-level RESET contracts and the training squadron maintenance contracts? This question is raised because the RESET contracts were never budgeted as part of the OP-20, but as future OCO funding will no longer be available. The only option would be to charge those contracts to the OP-20 if the requirement still exists (Harrell, 2011).

According to PMA-276, there was no official A-76 study done to create the RESET contractor crew but, due to an increase in operational tempo and deployment rotations of Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF), RESET contractor support was required. As a result, every year the Fleet is always over budget with regard to contract costs because the continued existence of contract cost will eventually shift to being charged to the OP-20 budget. These RESET contracts have to be renegotiated every six months (Lopez, 2011).

From a maintenance management perspective, if the Marine Aviation Fleet is saying there is no longer a need for some of these contracts, then the number of contracts should be reduced into one contract to fit the need of Marine Aviation. As the number of contractors that perform these daily maintenance functions associated with contract maintenance for the tactical squadrons is reduced, several benefits can be realized. The first benefit is that 100 percent of the contract support efforts will be directly maintenance-related because they are not deploying, which will be performed by SMEs that formerly served in the intermediate and senior enlisted Marine Corps Aviation maintenance ranks. There will exist less of a learning curve and more continuity as time evolves. A second benefit of fewer contractors on the flight line is that those same tasks can be performed by Marine Maintainers, thus reducing the technical atrophy that existed in the Marines. The Marines will become more efficient by consistently developing the basic journeyman master mechanic skill sets required of a flying squadron Maintainer. The gained efficiency will lead to improved maintenance and repair system workload flow (Goodson, 2011).

The training squadron maintenance contractors are augmented to train and educate the Marines. However, as the Marines begin to rely on the contractors, they

attained atrophy in those basic journeyman master mechanic skill sets that are especially needed as the Marines transition from a training environment to a deployable or tactical environment. History has shown that Marines at the O-level and I-level have been acquiring those skills sets for years prior to the introduction of the RESET/Preset and training squadron maintenance contracts. Over the last three years, the amount of money that has been spent on those contracts was not budgeted for in the OP-20. A third benefit from having a reduction in RESET/Preset contractors on the flight line will help reduce future costs (contract fees) by streamlining and standardizing the contract maintenance support process. This process will assist in meeting the needs of Marine Aviation by allowing for a better allocation of contracts across Marine Aviation to provide better transparency, oversight, and control. This is important to remember because once OCO funding no longer exists, the funding will come directly out of the OP-20 funding if the needed contract maintenance support requirement still exists for RESET work at the TACAIR level. Again, once that OCO funding is no longer available due to projected budgetary constraints, the funding must be provided within the OP-20 baseline, which will contribute to drive up the overall H-1 Upgrade budget. As the USMC consolidates the contract maintenance support contracts into one contract and becomes more aggressive in ensuring that their Maintainers have their qualifications or journeyman master mechanic skill sets, there will be more transparency and oversight, and the needs of Marine Aviation will be met. It also reduces future costs that assist in improving budget execution for current and future justifications for POM submissions (Goodson, 2011).

6. Fuel

This portion of the OP-20 is an independent driver that cannot be controlled by the Fleet. Research can be done across Department of Defense (DoD) activities. Conversely, from a CPH perspective, this has to be accepted as it is a part of the CPH equation (Harrell, 2011).

D. CONCLUSION

In this chapter, the CFT approach to addressing AVDLR, AFM, price challenges, and contract maintenance support are all linked to the CFT approach of effective communication. As the MALS focuses on increasing RFI rates and reducing BCM rates, more capability is gained at the MALS that leads to saving AVDLR cost in the long term. This is contingent on the implementation of O-level Operations and O-level Maintenance deliberately communicating in an effort to gain more efficiency that allows for a more effective workload flow output in the long run. This will lead to improved maintenance and repair workload flow, and projected demand to enhance budget execution for current and future POM submissions, with the exception of fuel. Fuel is an independent factor. The next chapter will focus on PMA-276's overall strategy of reducing costs and improving demand projections that validate current and future POM submissions.

IV. PROGRAM MANAGER 276 (PMA-276)

A. INTRODUCTION

This chapter discusses how PMA-276 networks with Marine Aviation in an effort to improve budget projections that lead to more accurate POM submissions. The use of the Cost Adjustment Sheets (CASs) aids in creating FHPs across the Fleet and is a key component in PMA-276's strategy to improve budget predictions for the POM. This level of effort comes in to play as the H-1 Upgrade platform switches from APN-6 to NWCF funding.

B. BACKGROUND

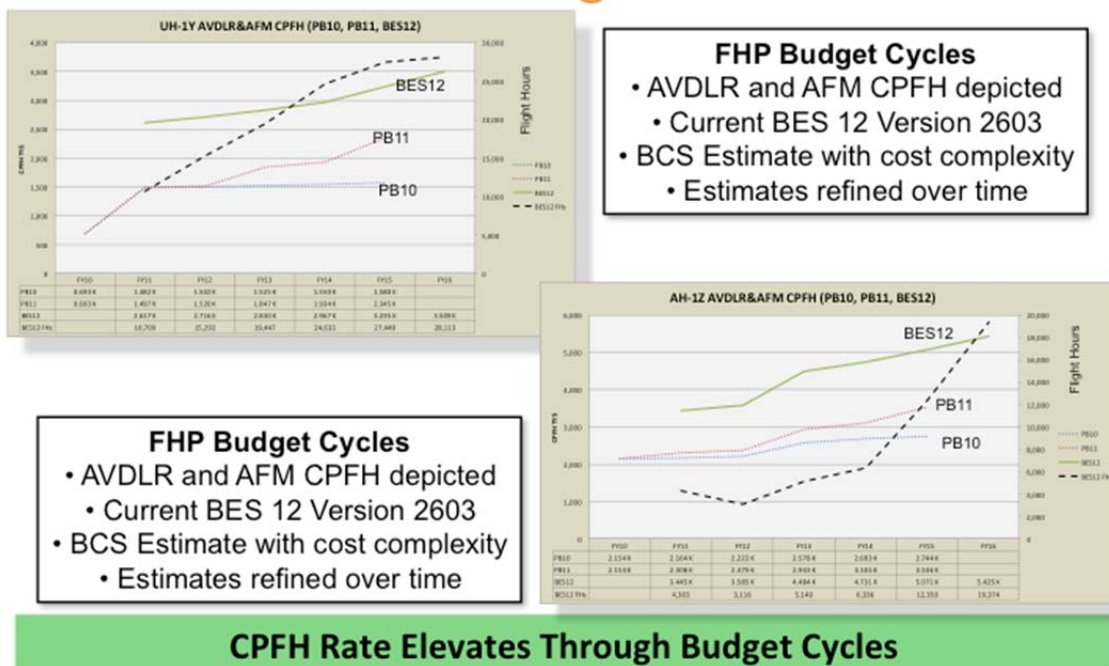
NAVAIR's PMA-276 manages the cradle-to-grave procurement, development, support, fielding, and disposal of the Marine Corps rotary-wing, close-air support, antiarmor, armed escort, armed/visual reconnaissance, and fire support program systems (NAVAIR, 2010). Within the H-1 community, the AH-1W, AH-1Z, UH-1N, and UH-1Y are the direct results of the implementation and management of a comprehensive, affordable, and effective systems-support strategy, within Total Life Cycle Systems Management. Life-cycle logistics includes the entire system's life cycle, including acquisition (design, develop, test, produce, and deploy), sustainment (operations and support), and disposal, which is the foundation for Performance-Based Logistics (PBL).⁸ At the current stage of the UH-1Y process, the post-production support decision process of providing sufficient spares and repair parts for the H-1 Upgrade platform is intertwined with life-cycle sustainment best practices that focus on material availability, material reliability, ownership cost, and mean downtime (Defense Acquisition University [DAU], 2009).

⁸ Performance-Based Logistics is the process of identifying a level of performance required by the warfighter and negotiating a performance-based contract between the government and the product support integrator or OEM of the total system.

C. STRATEGY

One key strategy is to focus on PMA-276 interactions with the MARFOR. PMA-276 assists the MARFOR with budget developments for future years and how they adjust the budgets. For example, PMA-276 requests bottoms-up AVDLR Estimates and AFAST-Based AFM Estimates for Program Objective Memorandum 13 FHP submissions that are due around November of each year. These data contain technical, cost, and programmatic information that assists CFT stakeholders in developing CAS, one of the key contributing factors in creating the flying hour projection system (FHPS) or the OP-20. The CAS allows stakeholders to make increases and decreases that are comparative to the new baseline based on cost risk, because as cost increases are predicted, unplanned bills are prevented from entering the Fleet, while cost decreases help return dollars to the Fleet to accelerate increased readiness. Therefore, as new budgets are developed each year, new aircraft are fielded with a new baseline, while already outfitted aircraft get the previous year's actual CPH. From this, the CFT stakeholders are able to provide a more thorough estimate, which can accurately define confidence levels for future years. Over time, these budgets are revised, as depicted in Figure 6 (Rhodes, 2011).

UH-1Y and AH-1Z Historic Budget Profiles



CPFH Rate Elevates Through Budget Cycles

Figure 6. H-1 Historic Budget Profiles (From Rhodes, 2011).

Figure 7 depicts how, as the costs of budgeted aircraft increase, forecasted flight hours are aligned in the POM to the budget aircraft cost and help mitigate cost risk.

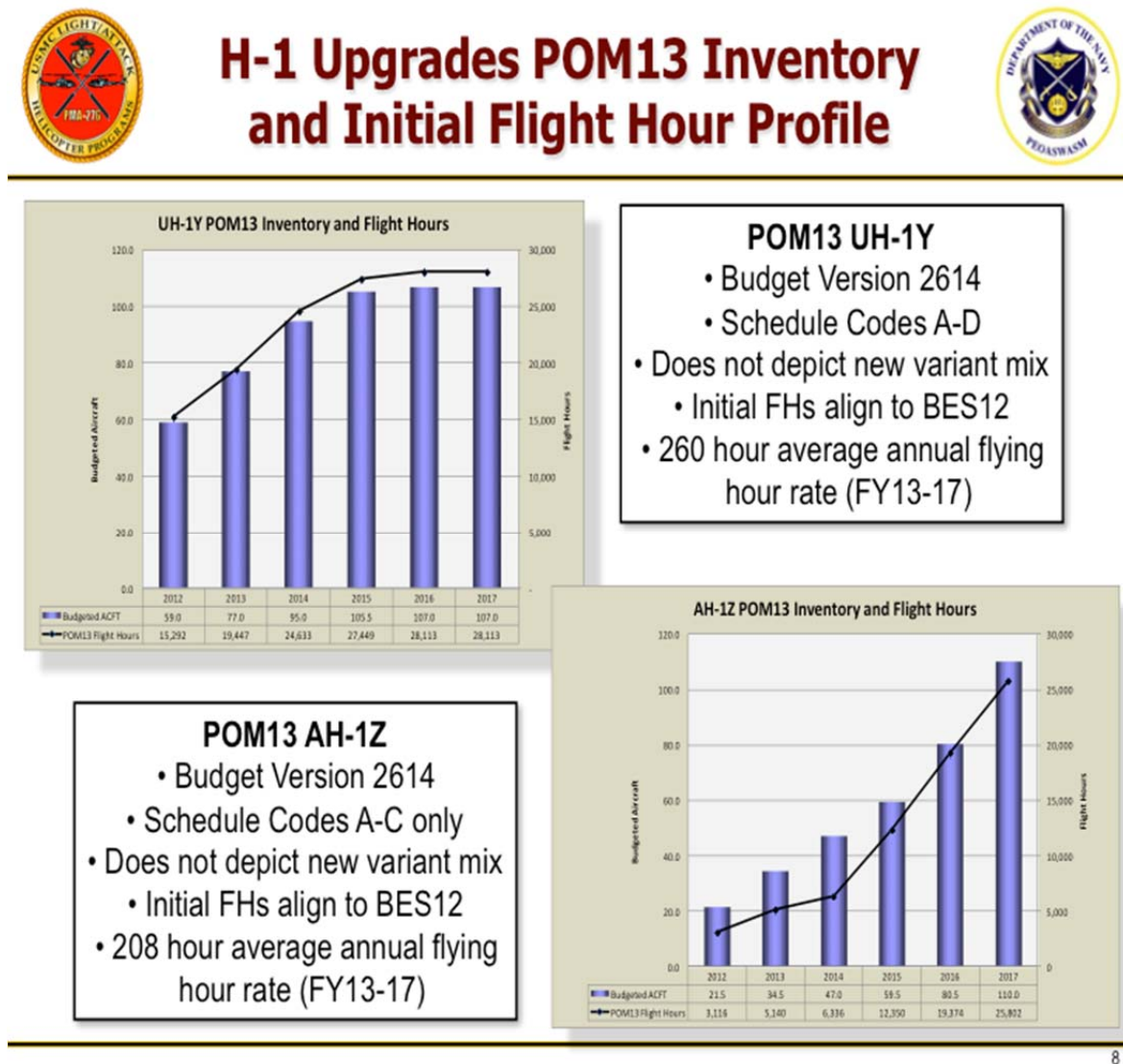


Figure 7. H-1 Upgrades POM13 Inventory and Initial FHP Profile
(From Rhodes, 2011).

Figures 8 and 9 depict how AFM and AVDLR cost risk can be minimized in future FHPs by utilizing adequate cost data that are passed up the line through the CFT approach. This mitigation of cost risk aids in creating better budget projections for the POM because it accelerates readiness associated with confidence levels.

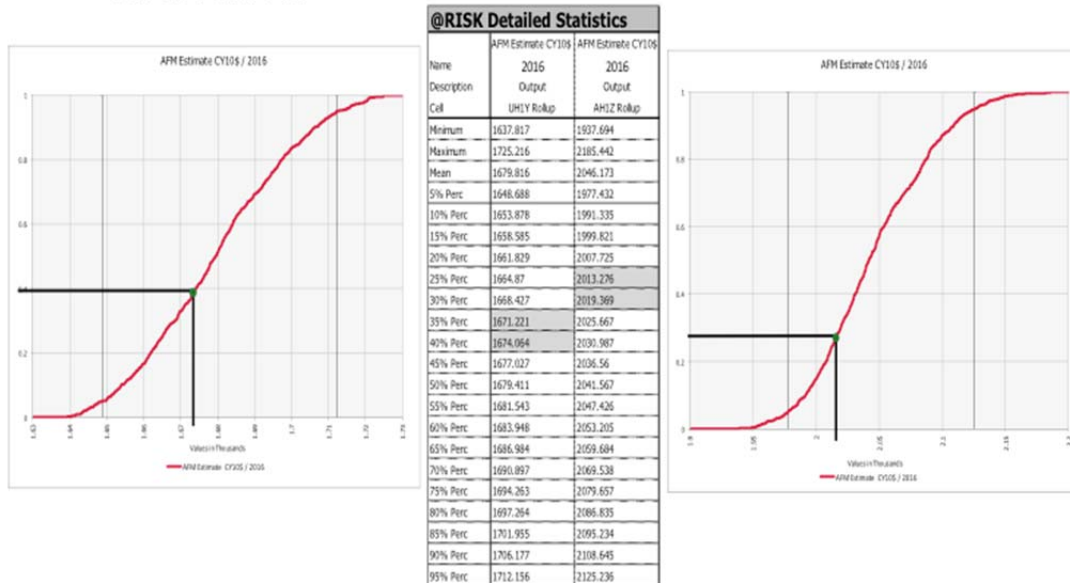


Cost Risk in AFM Estimate



~39% Confidence that \$1,673
per FH will be sufficient for FY16
UH-1Y AFM FHP

~27% Confidence that \$2,015
per FH will be sufficient for FY16
AH-1Z AFM FHP



Cost Inputs Used as a Basis for Assessing Risk
Range of Non-JCN Cost, and Range Z to Y Cost Factor

23

Figure 8. H-1 Upgrade Cost Risk in AFM Estimate (From Rhodes, 2011).

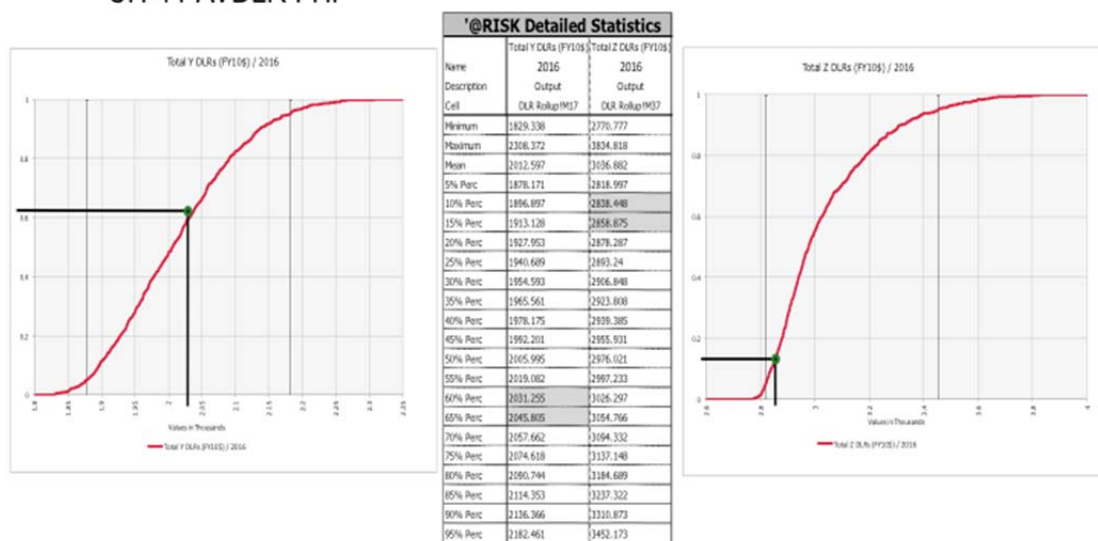


Cost Risk in AVDLR Estimate



~63% Confidence that \$2,039
per FH will be sufficient for FY16
UH-1Y AVDLR FHP

~12% Confidence that \$2,850
per FH will be sufficient for FY16
AH-1Z AVDLR FHP



Component Reliability Inputs Used as a Basis for Assessing Risk

24

Figure 9. H-1 Upgrade Cost Risk in AVDLR Estimate (From Rhodes, 2011).

An example to illustrate how the CAS has been implemented to mitigate risk for the H-1 can be seen at MALS-39. For example, at post-MSD, the UH-1Y CPH was estimated at \$1,497, but with a new platform transitioning, it would have been impossible to perform at that \$1,497 when compared to how it was performing at pre-MSD, which was \$1,600. As the Fleet starts flying those aircraft assets from APN-6 funding (which is no charge funding to the Fleet) to the NWCF (Fleet being charged), the price will not remain at that standard due to having an incorrect CPH. To remedy this, a CAS was submitted to correct this issue. In this example, a CAS was submitted to pull money from other activities that were underexecuting within their OP-20 targets, which helped

increase the UH-1Y CPH to \$3,000.00 for TACAIR. Even though the funding was available, the UH-1Y was executed under that \$3,000 by 46 percent because those AFM and AVDLR parts are more reliable than the Fleet expected. By identifying issues like this, the Fleet was able to focus its efforts toward other issues (Harrell, 2011).

Keep in mind that the AH-1Z is below its CPH because it is still in the PMSD period. The target OP-20 cost is \$2,195.84, while the actual cost is \$1,891. This is due to the 84 percent commonality of parts shared between the H-1 upgrade and legacy aircraft (Wecksler, 2011). For example, when those components (e.g., main rotor transmission box) transform over to the UH-1Y, they also cross over into the AH-1Z, although they have not reached MSD. UH-1Y is the main focus for this because it reached post-MSD as of July 2010 (Harrell, 2011).

D. CONCLUSION

PMA-276's collaboration with the MARFOR created the use of the CAS to adjust baseline budget costs while reducing cost risk. Reducing cost risk is the key to predicting better budget POM submissions because it allows PMA-276 to perform more thorough annual estimates that prevent unplanned bills from entering the Fleet. The unplanned bills create a cost savings that decrease costs and assist in returning saved funding back to the Fleet to accelerate readiness. The accelerated readiness accurately represents confidence levels for future years based on reduced risk. The next chapter will focus on how NAVSUP WSS assists in improving maintenance and repair system workload flow.

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V. NAVAL SUPPLY WEAPONS SYSTEMS SUPPORT (NAVSUP WSS)

A. INTRODUCTION

This chapter focuses on how NAVSUP WSS uses the CFT approach to create dialogue between NAVSUP WSS and the OEM for streamlining the overall process. NAVSUP WSS's provisioning strategy focuses on obtaining spare parts for the Fleet in a timely manner. Within the provisioning strategy, key elements of the entire process will be addressed. NAVSUP WSS's strategy for obtaining spare parts is essential to improving USMC maintenance repair workload flow.

B. BACKGROUND

NAVSUP WSS (formerly known as Naval Inventory Control Point [NAVICP]), falls under the Naval Material Supply Chain Management. NAVSUP WSS's mission is to distribute Navy, Marine Corps, and Joint and Allied Forces program and supply support for the weapons systems that those Naval forces in order to maintain a mission-ready status. It covers a line of supply of over 430,000 aircraft repair parts. NAVSUP WSS applies funds from the NWCF to buy and repair the parts and, in turn, sells them to Fleet customers such as MALS. This allows for Navy and Marine customers to receive needed parts at any location around the world. This mission is carried out by a single command organization operating as a tenant activity of the Naval Support Activities in Mechanicsburg and Philadelphia (Naval Supply Systems Command [NAVSUP], 2011).

Within NAVSUP WSS, the roles and responsibilities include coordination of contractor and organic Depot Source of Repair (DSOR); budgeting for acquisition shop replaceable assemblies (SRA) and consumables; budget execution, cataloging inventory control point (ICP) and DLA-managed items; procuring within budgetary parameters and close coordination with contracting; reliance on file demand data for SRAs and consumables that help track asset frequency and repair frequency; and handling the Bell "Corporate" Direct Vendor Delivery (DVD) contract (Haftel, 2011).

C. PROVISIONING STRATEGY

NAVSUP WSS acquires H-1 Upgrade components within the Integrated Logistics Support Department (ILSD). ILSD has five divisions: supply chain solutions, life-cycle management, material support, acquisition logistics planning, and logistics data development. From the initial supply support perspective, supply support—in its most common practice—is focused on spare parts. This process starts with the interim supply support (ISS) process, lasting through provisioning to material support date, and beyond the life cycle of the system from Milestones A to C. In other words, after concept exploration and component advanced development phases in Milestone A, the transition from ISS extends to MSD, which begins with having a robust supply support management plan (SSMP), provisioning statement of work (PSOW), maintenance plan (MAPL), and a preliminary logistics support analysis record (LSAR). Once these key items are established, the Item Selection Process (ISP) or provisioning and procurement process simultaneously work together beginning mid-Milestone B and throughout Milestone C's low-rate initial production and full-rate production and deployment phase. During this transition to MSD, the ISP or provisioning takes place. Therefore, as the system advances, the supply support effort should advance with it, thus ensuring that the Fleet has the needed spare parts. This involves file maintenance and change processing requests during post-MSD supply support. During the post-MSD phase, supply support is specifically focused on getting those spare parts on the shelf. This involves budgeting, procurement, managing repair, order fulfillment, allowancing, piece part support, and program support. This overall process is the basis for the Program Support Inventory Control Point (PSICP), as depicted in Figure 10 (Gallagher, 2011).

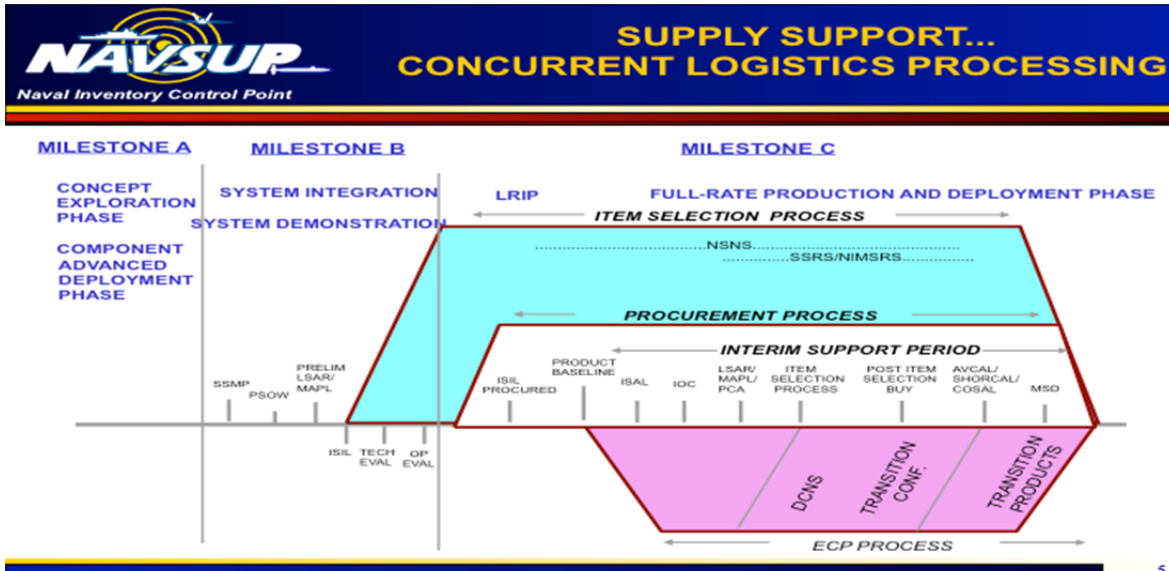


Figure 10. NAVICP Supply Support Concurrent Logistic Process Chart (From Gallagher, 2011).

D. PROVISIONING PROCESS

1. Provisioning Statement of Work (PSOW)

According to NAVSUP WSS, the provisioning or item selection process is a management process for defining and obtaining the range and depth of support items required to operate and maintain an end item of material through its life cycle. Within the logistics data development, provisioning begins with funded operational requirements guidance provided by the Program Executive Office (PEO), who has direct oversight of the cost, schedule, and performance of the H-1 Upgrade total life-cycle cost and reports in-service support to the Chief of Naval Operations (CNO). Based on that guidance, and with the assistance of the Integrated Weapon Support Team (IWIST) Logistics Element Manager (LEM) and NAVAIR's APML, the Supply Support Management Plan (SSMP) is created, which gives guidance to the provisioning analyst (PROAN). The PROAN prepares the Provisioning Statement of Work (PSOW). The PSOW contains operational requirements that will be included in the hardware acquisition contract. It also establishes an Acquisition Logistics Production Planning (ALPP) data record. This PEO-driven document is a collaborative effort between the contractor and customer. It shapes the

required provisioning deliverables for interim supply support based on items defined by operational product specifications. Finally, the PSOW is finalized to fit in the hardware acquisition process in which the contractual requirement for the scheduled delivery of data products or provisioning performance schedule (PPS) is adhered to (PSOW Project Team, 2008). Items to include in the PSOW are:

- PSOW/Provisioning Requirements Statement (PRS) Details
- Provisioning Performance Schedule (PPS)
- Supportability Analysis Summaries/Guidelines
- Demilitarization Code Guidance
- Criticality Coding Guidance
- Logistics Management Information Data Product Deliverables (DPDs)
- Contract Data Requirements Lists (CDRL) (Provisioning Statement of Work [PSOW] Project Team, 2008, p. 5)

For large provisioning, such as the H-1 Upgrade, direct dialogue with the OEM of the equipment is required. This dialogue allows the PROAN to gain a better understanding of how the contractor plans to support the H-1 Upgrade in Milestone B and C phases within data support and supply support. This information allows for a more structured Request For Proposal (RFP) based on the total number of line items, total number of data elements per line item, and number of drawings required. This is extremely helpful because as the contractor requires knowledge from NAVSUP WSS to enable them to submit an RFP, NAVSUP WSS can issue an informational PSOW (IPSOW) (PSOW Project Team, 2008).

2. Provisioning Data Determination

Provisioning consists of being assigned to a contract centered on PTD quality data gained that can evolve around new weapon systems or subsystems, modification from an existing weapon system, or contractor logistics supported. Since the H-1 Upgrade's configuration is based on a modification from the AH-1W and UH-1N or existing system (ES), the intricacy and amount of logistics data acquired from the contractor are all encompassing. Bell Helicopter maintains a database of specific requirements for supply support, support equipment, technical publications, manpower and personnel, packaging,

handling, storage, and transportability. These data requirements for the H-1 Upgrade are laid out within an approved MAPL, Provisioning Parts List Index (PPLI), and Provisioning Requirements, which include all components, assemblies, and piece parts in a top-down, break-down order. The LSA-024 is used to ensure that failure rates are in agreement with Source Maintenance and Recoverability (SM&R) codes. The LSA-151 is used to spot-check the next lower assembly SM&R code in concurrence with the next higher assembly. The LSA-036 is used to ensure that a single line entry was properly classified in a separate Provisioning Contract Control Number (PCCN). This information is utilized for various provisioning conferences to assist in pinpointing repair parts requirements in support of the equipment to be managed (PSOW Project Team, 2008).

3. Logistics Support Analysis Record

Upon creation of the PSOW, according to the *ILS Department Provisioning Analysis Guide*, the LSAR is the depository for information regarding the technical characteristics of the weapons system/subsystem. These technical features are the results of the Failure Modes, Effects, and Criticality Analysis (FMECA); Reliability Centered Maintenance (RCM); Level of Repair Analysis (LORA); and various other types of logistics models. The LSAR can incorporate data for the 10 elements of Integrated Logistics Support:

- Supply Support
- Support Equipment
- Maintenance Planning
- Technical Data
- Design Interface
- Computer Resources Support
- Facilities
- Packaging, Handling, Storage and Transportation
- Training and Training Support
- Manpower and Personnel (PSOW Project Team, 2008, p. 13)

These disciplines are completed by task. The tasks are as follows:

- Task 100 series: Program Planning and Control
- Task 200 series: Mission and Support Definition
- Task 300 series: Preparation and Evaluation of Alternatives
- Task 400 series: Determination of Logistic Support Resource Requirements
- Task 500 series: Supportability Assessment (PSOW Project Team, 2008, p. 13)

Among these elements, the PROAN is only concerned with maintenance planning, supply support, and the support equipment tasks (PSOW Project Team, 2008).

a. Maintenance Plan

A key element of the LSAR is the maintenance plan. The maintenance plan explains how and when the maintenance will be conducted and provides support requirements for each maintenance phase (PSOW Project Team, 2008).

b. Interim Support Item List (ISIL)

A key element within the LSAR is the Interim Support Item List (ISIL). It deals with supply support that assists the PROAN in the provisioning process. With regard to the H-1 Upgrade, the contractor submits the ISIL for review and approval. It contains suggested items and quantities determined to be a requirement for removal and substitutes for the O- and I-level maintenance during the ISS period, from first distribution of a new or modified weapon system to its MSD. Also, when required, the Long Lead Times Items List (LLTIL) and the Common and Bulk List (CBIL) are to be added to the ISIL. Due to their 24-month or greater time-frame constraint, LLTIL items are identified early on in the life-cycle system in order to meet delivery time, which is always dependent on the operational need date. The CBIL contains all standard hardware and bulk items that are used for repair and maintenance on the aircraft and aircraft engines. This ISIL submission process is also where the early national stock number (NSN) assignment originates, but it is not final until technical and operational evaluations are complete. Upon approval of the ISIL, NAVSUP WSS releases the Interim Support Items Order, which reflects the first field of equipment or initial operational capability

(IOC). This is also where the MAPL document approval takes place between the contractor and NAVSUP WSS (PSOW Project Team, 2008).

c. Design Change Notice

Provisioning consists of two methods. The first method is the engineering data for provision (EDFP), the least preferred because more of the transfer of work is placed on the government rather than on the contractor. The second method is called design change notices (DCNs), the most productive type of provisioning because it contains items that are needed for new design as well as the similar items that were used on the prior design. DCNs have two types: manual design change notices and the MIL-STD-1388 3B automated DCN processing. The PROAN uses the DCN to request data on behalf of the government, because the contractor has no obligation to provide data. DCNs are associated with a cost and should be used as technical data and not used to update unit prices or production lead times (PLT) (PSOW Project Team, 2008).

As mentioned earlier, the LSA-036 is used to classify single line entries as Provisioning Contract Control Numbers (PCCNs). PCCNs are mandatory for the assignment of the allowance requirements register (ARR) in the Interactive Computer Aided Provisioning System (ICAPS). DCNS can be performed manually and are used after the physical configuration audit (PCA) or the provisioning baseline file (PBF) is started and has been provisioned, which can add, delete, supersede, or modify items formerly listed that are accepted for integration into the end item. NAVSUP WSS has a 60-day policy following the PBF submission that allows the Defense Logistics Information Service (DLIS) to assign NSNs to components provisioned, catalogued, and properly updated in the master information file (MIF). The ILS Tracking program is the depository for examining all internal DCN traffic. This information can be found in the ALPP system (PSOW Project Team, 2008).

Not only do DCNs safeguard the configuration change for the old configuration item to new configuration item of supply, but they assist with two major strengths in the Milestone B process: integrated system design and system capability and manufacturing process demonstration. Within the integrated system design and system capability and

manufacturing, the PM will have a better description of the product baseline for the life-cycle system, improved percentages of build-to-packages completed, and a higher ability to demonstrate that the life cycle will operate in a useful way, consistent with the approved Key Performance Parameters (KPP) (Department of Defense [DoD], 2008). Based on this information, the IWST equipment specialist has more involvement with the ES because, as they are more able to obtain data and depending on the data type, either manually or digitally, they can update the MIF by establishing the new configuration. Even though the IWIST and APML have a key role in this process, it is the PROAN's role to select the best type of provisioning that accounts for cost in the provisioning effort and the allocation of workload from the government to the contractor (PSOW Project Team, 2008).

4. Item Selection Process (ISP)

Within the ISP, ICAPS is the model commissioned by NAVSUP WSS to take various inputs and load various data files that can be edited, validated, and automatically input repetitive entries. The ISP process begins with loading raw LSA-036 data into ICAPS, in which the MIL-STD-1388 format is utilized to format the ICAP load in a T Dump (TDMP) or LSA-036 sequence file. Once validated, the data is loaded to the Unit Continuous Improvement Plan (UCIP) and populated into the MIF. This is the key to completing the ISP because if the 10 percent error rate for AFM and the 2 percent error rate for AVDLR during the ICAP validation process are exceeded, the IWST and PROAN must discuss a plan to reject the DCN package for nonconformance. A formal letter is sent to the contractor, along with the DCN package. The contractor has 45 days to correct and resubmit and, if they cannot comply in a timely manner, the APML and Contracting Officer will be notified to take appropriate action. Conversely, if the AFM and AVDLR error rates are not exceeded, then acceptance is given by sending a signed DD-250 to the contractor within 30 days (PSOW Project Team, 2008).

At this point, temporary Navy Item Control Numbers (NICNs) are initially assigned and sent to DLIS, along with its drawing for cataloguing and NSN assignment. Once NSNs are established, they are sent to NAVSUP WSS to replace the temporary

NICNs and assigned a 1R or 7R COG within the MIF. At this point, the NSNs are considered a stock record. This means there is no stock or recorded supply activity. The end product resulted in an NSN assignment that could range from 30 to 120 days for Navy-managed items, but with the implementation of the Enterprise Resource Planning (ERP) tool, the process will be reduced down to 10 days for DLA managed items. The implementation of the ERP tool will help reduce the use of C/10-C14 processes and the UCIP. The end result of this process consists of NSNs being loaded to the MDF, Weapon System File (WSF), and Federal Logistics Information System (FLIS) as long as the items match within the process provisioning language (PPL) and ISIL (PSOW Project Team, 2008).

5. Supply Support Request (SSR)

Another attribute of the NAVSUP WSS provisioning process is the Supply Support Request (SSR).

When available, Engineering Data for Provisioning (EDFP) shall be submitted for all SSRs or offers involving items without NSNs or Permanent System Control Numbers (PSCNs) assigned, where the item is not identified by a government specification or standard which completely describes the item (including the physical, material, dimensional, mechanical, electrical, and functional characteristics) (Department of Defense Directive [DoDD], 2010, p. 10).

EDFPs consist of technical documentation of components for maintenance support considerations that assist in assigning NSNs, reviews for item essentially coding, regularization, reviews for part interchangeability and substitutability, item management coding, allowance preparation data, initial procurement from contractor and OEM, and demilitarization code assignment. SSRs utilize drawings that are mandatory for the MIF of Navy-managed items. These drawings are delivered to DLIS and NAVICP personnel for Item Name assignment, Federal Stock Class (FSC) determination, and allocation of packaging codes and other appropriate data characteristics (PSOW Project Team, 2008).

SSRs are viewed in the Joint Engineering Data Management Information Control System (JEDMICS), which is a DoD program that permits the viewing of technical data by computer terminal. The PROAN is responsible for preparing the CDRL for the EDFP

in such a manner that the delivery of data will be in CDEX format for import to JEDMICS for the ISP. Even though the ILSD has not provided guidance for the cost of printing the drawings from JEDMICS, the PROAN reviews the drawing package upon receipt to ensure the drawings are in Provisioning List Item Sequence Number (PLISN) sequence and that there are no missing drawings. Each item in the LSA-036 that does not have an NSN assigned should have a drawing. The assignment of an NSN for interim support does not negate the need for a drawing. Items containing Military Standards are not required to have a drawing, whether they are assigned an NSN or not. The approval of the DD-250 should be held until the contractor provides the missing data. If it is anticipated that this will take longer than 30 days, the PROAN must arrange a formal letter to refuse the data as being insufficient for the provisioning (PSOW Project Team, 2008).

The PROAN obtains a letter of refusal on official company letterhead confirming that the supplier does not intend to comply with the data requirements imposed on them by the prime manufacturer. Next, the PROAN tries to obtain the required data directly from the supplier. In some cases, the supplier will deliver the drawings directly to the government, once the government agent explains the reason and purpose for the drawing request. In very unique cases, the government agent may do an onsite visit at the contractor's facility to evaluate the drawings. This should be brought to the attention of management for assignment of personnel to get the job done (PSOW Project Team, 2008).

E. PROCUREMENT PROCESS

The Item Manager (IM) computes requirements in the ERP toolkit. Once the requirement is generated, a purchase request (PR) is generated and sent to the item technical management procurement, along with several potential sources. The ES reviews and assigns an Acquisition Method Code (AMC) and Acquisition Method Suffix Code (AMSC) where configurations and part numbers are validated. In the event of potential sole source procurement, a justification and approval (J&A) is attached to justify that there is not a need to procure without full and open competition that is required by the

Federal Acquisition Regulation (FAR). Next, the PR is routed to Contracting and assigned a folder and buyer. The buyer creates an RFP and submits it into FedBizOpps, where it will sit for 30 days. After 30 days, quotes are received, reviewed, and negotiated, and a contract is awarded.⁹ After contract award, the contractor manufactures the requested item and, upon delivery, items are inspected and received. The procurement can range from three months up to a year, depending on the item procured (Gallagher, 2011).

F. CONCLUSION

NAVSUP WSS's provisioning and procurement process concurrently work together beginning mid-Milestone B and throughout Milestone C's low-rate initial production and full-rate production and deployment phase. Therefore, as the life-cycle system advances, the supply support effort advances with it, safeguarding the Fleet by obtaining required spare parts to include file maintenance and configuration changes from old configuration items to new configuration items of supply. This allows the PM to have a better description of the product baseline for the system and percentage of build-to-packages that assist with two major strengths in the Milestone B process: integrated system design and system capability and manufacturing process demonstration. The CFT approach allowed for direct dialogue between NAVSUP WSS and the OEM to gain a better understanding of how the contractor plans to support the H-1 Upgrade. This better understanding leads to a more well-thought-out RFP that provides a better flow of information at the beginning of the ISP. The improved flow of information throughout the ISP cuts down on SSRs because the data requirements in the RFP have clear drawings that allow for the IM to award contracts based on timely submitted PRs. As contracts are created in a timely manner, NAVSUP WSS's strategy for obtaining those contracted spare parts is essential to improving USMC maintenance repair workload flow because parts are getting to the Fleet at a faster pace. The next chapter will focus on how the DLA assists in improving projected demand to facilitate current and future POM submissions.

⁹ FedBizOpps: Single government point of entry on the Internet for federal procurement opportunities over \$25,000. It was designed to broaden the federal marketplace and minimize the effort and cost associated with finding government business opportunities.

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VI. DEFENSE LOGISTICS AGENCY (DLA)

A. INTRODUCTION

This chapter focuses on how the DLA uses the CFT approach to identify ways of improving Cost Recovery Rates (CRR). This is important because CRRs lead to better projection of demand and the follow-on cost for the FHP. As projections on demand improve, current and future POM submissions will continue to improve. DLA's pricing, provisioning, and procurement processes assist in achieving these improvements and will also be addressed in this chapter.

B. BACKGROUND

DLA delivers goods and services by utilizing the Defense Working Capital Fund (DWCF). Under the DWCF, customers' orders replenish the DWCF by bringing in revenue from the product items that are sold. DLA utilizes a CRR, which has been added to the cost of goods sold by including first endpoint transportation as well as material-related cost for special technical requirements, testing, and engineering support. The CCR consists of DLA's operating costs such as salaries, travel, accounting, and cataloguing and disposal of supply items. These prices and rates are based on modern commercial businesses price items in that they promise that all costs associated with getting the products to their customers are recovered, while no profit is made (Defense Logistics Agency [DLA], 2011).

C. STRATEGY

DLA creates CRRs based on a focused CFT approach resulting in cutting customer costs for end items, managing supplier relationships, and cutting internal costs that are reiterated in the CRR trend. DLA attempts to allocate cost as discretely as possible to specific cost drivers, with full consideration given to market pricing factors and their need to provide competitive prices to their customers. Similarly, during each

budget cycle, they adjust the future prices by recovering prior year losses or returning prior year gains. Thus, the costs fluctuate annually, but always with the customer's best interest in mind.

The DLA also uses the forecasting of parts based on O-, I-, and D-level demand usage as a method to help reduce the cost of the AFM parts, which helps predict the OP-20 overall cost. Recall that the NAVSUP WSS is responsible for provisioning and NSN assignment of all parts. This is a similar function for the DLA. The DLA is responsible for getting those spare consumable parts on the shelf, but the stocking policy and procurement process is different. In this case, it is especially prudent for the supported commands to know their stock requirements because of the unpredictable timing that is required to stock parts on the shelf. Therefore, it is vital to communicate those requirements properly. These initial and replenishment requirements values are based on flying hours, equipment, and fail rates derived from the three models: depot-level repairable, field-level repairable/consumables, and support equipment. DLA assigns an Acquisition Advice Code (AAC) based on Initial Supply Quantity¹⁰ (ISQ), Replenish Supply Quantity¹¹ (RSQ), weapon system designator/essentiality codes, and source codes. AAC specifies how and under what constraints an item will be procured. AAC imitates three methods of application: by requisition, by fabrication or assembly, and by local purchase (DLA, 2011).

D. PROVISIONING STRATEGY

Many factors can interfere with DLA's NSN assignment and buy actions. Each NSN request has an SSR attached that is forwarded to DLA Richmond for review. SSRs provide management data and stock requirements, but if the data is incorrect they are rejected, which slows down the process. As stated earlier, poor or insufficient communication regularly leads to no action on an SSR rejection. In some instances,

¹⁰ Initial Supply Quantity: The quantity of an item required to satisfy initial military service support requirements. It normally consists of the accumulated on-board repair parts/initial outfitting requirements, and shore-based requirements for this item for the applicable provisioning project or end-use activity.

¹¹ Replenish Supply Quantity: The quantity of an item, which will be required for replenishment from the DSA distribution system during the first year of operation.

DLA's computations of initial stock requirements are too low to warrant procurement. In that case, DLA assigns an AAC of J. This means that DLA will procure nonstocked items, and will not initiate a buy until there is enough demand, which will extend the lead time.

As part of the PSICP perspective, DLA must collaborate with NAVSUP WSS on sourcing of critical weapon system items and issues with supply file maintenance actions on items with service interest. It is vital that communication on these types of collaborative efforts is held at a high importance, because the increase in response times can lead to procurement delays. Keep in mind that all Navy items should have an assigned weapons system designator code (WSDC), which affects the priority given to a component. One final note to consider about DLA's process is that special procurement requests (SPR) should be used if the customer has a critical need for a component because, without justification of the component through initial requirements, DLA will not procure the item due to their workload (Gallagher, 2011).

Based on the CFT approach, DLA's main focus is to make sure that its portion of supply support is there, while the Fleet should effectively communicate the requirements on a continuum. This will lead to an optimization in process practices based on the utilization of NAVSUP WSS and DLA expertise and data focus (Gallagher, 2011).

E. PROCUREMENT PROCESS

DLA stocks the majority of consumable (9 Cog) and field-level repairable components (3BD Cog) for the H-1 platform. DLA uses AACs to indicate how and under what constraints an item will be obtained (DLA, 2011). For items that have an AAC of D, DLA has a 96 percent stock availability. For items not stocked at DLA, the Fleet has implemented an initiative that focuses on improving local material availability by reducing AVDLR/FLR, BCM-4s, and cost. This initiative is intended to assist the goal of achieving responsive times to reliably replenish (TRR). Therefore, when items do not meet DLA's demand criteria they are assigned several AACs.

Items are assigned AAC J when they are managed, but not stocked, due to DLA's demand criteria. The Fleet localizes stock with AAC J assets to mitigate administrative and production lead times for items not carried at DLA's Defense Distribution Depots.

AAC H is assigned to items that are on an OEM/ Vendor Corporate Contract DVD. There are roughly 950 items for the H-1 on the Bell DVD contract. DLA holds Estimated Annual Demands (EADs) conferences, during which forecast quantities are provided to Bell on a yearly basis to determine stock availability for the next year. Therefore, Bell Helicopter gets cost incentive if they meet the Fleet's demand. If 81 to 87 percent material availability is met, they receive a 20 percent incentive on top of the catalogue price. If 87 to 90 percent material availability is met, they receive a 23 percent incentive. If Bell surpasses the 90 percent material availability criteria, they receive a 25 percent incentive. Under the existing contract, Bell is responsible for shipping Issue Priority Group 1 (NMCS, PMCS, ZC8, ZQ9, etc.) requirements within two days and IPG-II requirements within eight days. A CFT effort from the Fleet, FST Engineering, Depot, Bell, and Foreign Military Sales are involved in the EAD process to ensure the forecast is collaborative and accurate (Harrell, 2011).

The following AACs are major concerns for the H-1 Upgrade.

- AAC J: Centrally Managed by DLA but not usually stocked.
- AAC Z: Non-replenishment item; the 4/12/1 rule applies in which an item must have one demand within 4 demands of a total quantity of 12 over a 1 year period. DLA will initiate another buy when stock is at a minimum safety level (1/2 months demand) and then procure to the annual demand. Demand Planners do not see AAC Js or Zs due to DLA having a 77 percent stock rate for AAC Z items for the legacy H-1 and 37 percent for the Upgrade.
- AAC D: Centrally Managed and stocked: 97% stock availability; where the 4/10/13 Rule applies in which an item must have a demand in 4 separate months for a total quantity of 10 over a 13 month period. The Fleet will initiate stock buys to prevent minimum safety levels from being reached. DLA has a 96 percent stock rate for AAC D items for the Legacy H-1 and 91 percent stock rate for the H-1 Upgrade.
- AAC L: Open Purchase items only.

- AAC V: Terminal Item with Stock on hand; The Fleet must collaborate with counterparts and check the publications to see if item still exists or has changed. If the item is still required, then the Fleet Support Team and DLA are notified. The Fleet also checks for Interim Rapid Action Changes (IRAC). The Fleet also checks for any superseded NIINs or substitutes. If New NIIN or Part Number (P/N) is identified, the work center must initiate a Technical Publication Discrepancy Report (TPDR).
- AAC Y: Terminal Item: The Fleets checks for a superseded NIIN or P/N. If item is still required, then the Fleet follows AAC V procedures. (Harrell, 2011, pp. 1–2)

F. CONCLUSION

DLA's pricing strategy of provisioning parts and pricing out of NAVSUP WSS contributes to using CCRs to cut customer costs for end items, manage supplier relationships, and cut internal costs. This allows DLA to allocate costs as discretely as possible to specific cost drivers based on competitive market pricing. Those cost drivers aid in better forecasting of O-, I-, and D-level demand usage by properly communicating up the line to a specific AAC. Better forecasting reduces the cost of the AFM and AVDLR parts. This leads to the Fleet localizing stock with AAC J assets to mitigate administrative and production lead times for items not carried at DLA's Defense Distribution Depots. In addition, this helps predict better projection of demand and the follow-on cost for the FHP, thus improving current and future POM submissions. The next chapter will discuss the conclusion of how all of the contributing elements with Marine Aviation assist with improving maintenance and repair workload flow and demand projections that help in validating POM submissions.

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VII. CONCLUSIONS

A. INTRODUCTION

The goal of the project report was to provide an analysis for identifying the best practices associated with the reduction of overall costs for the H-1 Upgrade platform. The methodology involved collecting the necessary data needed to address this objective. This process also involved an analysis of supply chain management processes and evaluation of UH-1Y performance data obtained from the MALS, DLA, NAVSUP WSS, and PMA-276. The areas of focus consisted of the following:

- Implementation of MALS gained repair capability to reduce BCM rates.
- Implementation of the End-to-End process at the O-level, which has caused O-level efficiencies to become increasingly better over time.
- Addressing the reliability of parts by focusing on the MTBF items before scheduled removal, this gets addressed by PMA in the CILR.
- Implementation of price challenges on high AVLDR or consumable prices to DLA or NAVSUP WSS, and how NAVSUP WSS works with the FRC (Depot) to validate and justify the increase in price (frequency).
- Implementation of Fleet actions on reducing AFM costs based on usage of historical demand.
- Reduction of RESET/Preset and refinement of Contract Maintenance support contracts to help reduce costs.
- AFM and AVDLR cost analysis.
- Bottoms-up Fleet AFM and AFM-based estimates utilizing CAS to adjust annual POM FHP submissions assists in accelerating increased Fleet readiness.
- NAVSUP WSS's strategy of PCCN around DCNs.
- DLA's strategy that provisions parts and pricing out of NAVSUP WSS.

The results obtained from this analysis could provide the Marine Corps aviation community with a framework for reducing overall OP-20 costs. The information could also be used to assist with decisions regarding Marine Aviation POM submissions.

B. PRIMARY RESEARCH QUESTION

Can USMC Aviation Maintenance and repair systems be modified to smooth out workload flow?

Yes, Chapter III pointed out that squadron feedback provides the basis for root cause analysis that requires a CFT approach from all levels in order to understand, manage, and reduce costs within the OP-20. Based on the feedback provided, the following seven reasons show how USMC Aviation Maintenance and repair systems are modified to smooth out workload flow.

- First, the implementation of the MALS gaining more repair capability to reduce BCM rates leads to a gained savings in long-term AVDLR costs.
- Second, the workload flow is improved by gaining efficiencies at the O-level and applying those efficiencies to the I-level MALS production, based on having strategic communication with the Depot-level that support the O- and I-level implementation interface. These efficiencies are caused by ensuring maintainer qualification through ASM maintain core competencies and receiving good practice on aircraft. This allows those maintainers to acquire those basic maintainer journeymen, master mechanic skill sets that will lead to better trouble-shooting aircraft maintenance gripes and component failure (AVDLR and AFM parts). Effective and mature trouble-shooting of aircraft systems and components prevents the O-level from ordering excessive materials from supply and also prevents further BCM action when the MALS may not have repair capability.

- Third, by focusing on MTBF components before scheduled removal, the top 20 cost degraders within the CILR assist the PMA-276 in addressing the reliability of AVDLR parts by helping improve time on wing.
- Fourth, as the MALS addresses upward causes of AFM demand, such as fatigued life items along with scheduled removal items, these causes can be elevated up to PMA-276, DLA, and NAVSUP WSS to assist in reducing the overall H-1 Upgrade OP-20 costs.
- Fifth, the I-level implementation of price challenges to DLA, NAVSUP WSS, or BELL Helicopter when pricing of certain parts is higher in comparison to legacy pricing, based on the 84 percent commonality of part sharing, assists with offsetting AFM and ADVLR price increases.
- Sixth, NAVSUP WSS's provisioning cloud around PCCNs allows for DCNs to safeguard configuration changes from old configuration items to new configuration items of supply. This allows the PM to have a better description of the product baseline for the system and percentage of build-to-packages that assist with two major strengths in the Milestone B process: integrated system design and system capability and manufacturing process demonstration.
- Finally, the consolidation of contract maintenance support will allow Marines to gain more experience and become more efficient on the aircraft, eventually leading to improved maintenance and repair workload flows.

Answers to the secondary question will provide specific outcomes resulting in subsequent execution and procedural changes.

C. SECONDARY RESEARCH QUESTION

Is it possible to make a better projection of demand and consequent cost to the FHP to improve budget execution in the current year and future years to justify POM submissions and align planned versus actual cost execution in the Fleet?

Yes. Again, Chapter III mentioned how squadron feedback provided the basis for root cause analysis that required a CFT approach from all levels in order to understand, manage, and reduce costs within the OP-20. Based on the feedback, the following four reasons show how better projections of demand and consequent cost to the FHP can improve budget execution in current and future years to justify POM submissions.

- First, by looking at historical OP-20 data (AFM and AVDLR, specifically), the MALS can identify and solve cost issues that assist in more accurate cost estimations and budget execution analysis. Once these data are reviewed and reported up the line to the next higher tier, further overall OP-20 costs will occur due to Fleet-wide adoption.
- Second, the use of the CAS allows for PMA-276 to perform more thorough annual estimates that prevent unplanned bills from entering the Fleet and, as costs decrease, they assist in returning that saved funding back to the Fleet to accelerate readiness, which accurately represents confidence levels for future years.
- Third, DLA's pricing strategy that provisions parts and pricing out of NAVSUP WSS contributes to allowing the Fleet to localize stock with AAC J assets to mitigate administrative and production lead times for items not carried at DLA's Defense Distribution Depots.
- Finally, the consolidation of the RESET maintenance contracts would also reduce the funding and allocation of contract maintenance support and provide more transparency and oversight. Due to projected budgetary constraints, this consolidation would assist in reducing the overall

OP-20 budget that is provided within the OP-20 baseline, thus creating improved budget execution that validates current and future POM submissions.

D. OBSERVATIONS AND RECOMMENDATIONS

Chapter IV mentioned that the end state of a MALS is to focus on increasing Ready For Issue (RFI) rates and reducing BCM rates. The TMS Lead MALS should coordinate with all similar TMS MALS to identify every possible way to RFI a component based on the different maintenance codes, such as C1 and C3 for the I-level and depot maintenance to simultaneously repair. This methodology of the TMS Lead MALS coordinating efforts with all similar TMS MALS should be applied across the Fleet to TMSs other than the H-1 community. This coordinated effort would provide a more structured approach to smoothing out workload flows and having a greater impact on all projections of demand and all consequent costs to FHP. Greater projections of demand and consequent cost will improve budget execution in the current and future years for thoroughly justifying POM submissions and effortlessly aligning planned versus real cost execution across the Fleet.

E. SUGGESTIONS FOR FUTURE RESEARCH

Chapter III mentioned that fuel was an independent portion of the OP-20 that cannot be controlled by the Fleet. Some research should be conducted to determine anticipated rates based on usage via time of the year and location. For example, if fuel usage is higher when comparing a TMS that is deployed versus a TMS in the Continental United States, then that particular usage should take into account when calculating the OP-20. This could possibly create two separate OP-20 targets—one for the garrison flying squadrons and the second for the deployed flying squadrons. By having two separate OP-20 targets, it would allow the garrison and deployed MALS that maintain the BORs to have more control and oversight, resulting in more accurate and transparent BORs to report up the line.

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